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McCrone, Paul Richard

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ECONOMIC EVALUATION OF A SECTORISED COMMUNITY MENTAL HEALTH SERVICE

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PhD Thesis

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[illegible]

ABSTRACT

In the early 1990s the catchment area of the Bethlem and Maudsley Hospitals was divided into five geographically defined sectors. The aim was to develop community based mental health services within each sector. The *PRiSM Psychosis Study* was an evaluation of the move to sectorised community care in two of the sectors. These were compared longitudinally with hospital based care and also with each other as one sector developed an intensive form of care, whilst the other operated a more standard model.

Service use was measured for representative patients with psychosis before and after the development of community services in each sector. In the intensive sector there was a substantial fall, over time, in the proportion of people utilising in-patient care, and an increase in those using day centres and community psychiatric nursing services. In the standard sector there was also a large increase in the use of community psychiatric nurse care. The intensive sector had a greater use of supported accommodation at baseline and follow-up.

Service costs were calculated and these were shown to be higher in the intensive sector than in the standard sector. This was mainly due to the higher level of supported accommodation and a greater use of many services. Total costs were relatively static over time. Regression analysis was used to explore cost variations. Higher costs were associated with greater levels of disability and symptomatology.

Outcomes were measured and these were slightly better in most cases in the intensive sector. However, cost-outcome ratios appeared superior in the standard sector due to the lower service costs there.

Finally, production functions were developed in order to identify service costs that were predictive of outcome. Higher costs of community psychiatric nursing, general health care, social services and accommodation were associated with higher levels of quality of life.

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PREFACE

This thesis has been written while I have been working as a Lecturer, and subsequently Senior Lecturer, in Health Economics in the Section of Community Psychiatry (PRiSM), Institute of Psychiatry, at the University of London. The client level data used in the analyses were collected by a number of research workers, with service cost information collated by myself. A paper has been published based on the data presented in Section 5 of the thesis (McCrone et al, 1998b), and another based on the analyses reported in Section 6 is in press (McCrone et al, 2001).

I would like to acknowledge the contribution that other people in the Section of Community Psychiatry (PRiSM) have provided to enable this PhD to become a reality. It is also important to recognise that the study would not have been possible without the co-operation of service users, staff and carers.

Special thanks go to Professor Martin Knapp who has supervised this PhD and to Professor Graham Thornicroft who supervised my work on the *PRiSM Psychosis Study*.

I would like to dedicate this thesis to the Lord, and of course to Joanne, Anise and Alina.

1. INTRODUCTION

1.1 Structure of thesis

This thesis is based on an economic evaluation of sectorised community mental health services in Camberwell, South London. This first section provides background information on the topic and reviews the relevant literature. This is followed in Section 2 by a description of the overall study. Section 3 describes the services which were of specific interest to the evaluation. The design of the study is covered in more detail in Section 4 which also presents information on the patient samples used. The methodology by which service use was measured and costs calculated, and the results of this process, are given in Section 5. An important aspect of this thesis has been to identify factors which are predictive of service costs, and Section 6 covers this area. Costs and outcomes are combined in the form of a cost-consequences analysis in Section 7. This is taken further in Section 8 when analyses are performed to identify which aspects of service costs influence patient outcomes. Finally, in Section 9, concluding points and implications of the study are provided.

1.2 Background

In recent years there has been much debate in the UK about the development of community care for people with mental health problems. There is a popular belief that community care is in some way new. However, the phenomenon of deinstitutionalisation has in fact been going on since the psychiatric hospital population peaked at 148,000 in 1954 (Murphy, 1991). Two of the possible reasons for deinstitutionalisation are (i) the introduction of anti-psychotic medication and (ii) a growing realisation that prolonged residence in psychiatric hospitals did not improve the patient's condition. However, the conventional theories that seek to identify reasons for deinstitutionalisation are not without dispute. Goodwin (1997) suggests that for the emergence of psychotropic drugs to be the cause two criteria should be met. First, the drugs should have proven effectiveness. Goodwin points out that much of the research

that went into showing such effectiveness was not scientifically rigorous, and there is a body of opinion that believes psychotropic medication to be ineffective and even harmful. Second, there should be a noticeable reduction in hospitalisation, or an increase in the discharge rate, following the introduction of the new drug therapies. Goodwin notes that the only in the US and UK was the psychiatric hospital population falling at that time, and actually the decline began prior to the drugs' introduction. He does not though totally negate the impact of these drugs.

Most people with mental health problems since the 1950s have been treated primarily in the community. This is particularly so for those with more common problems (Goldberg and Huxley, 1992), but also for those with serious long term conditions. For many people, mental health problems cause ill health periodically, and whilst short episodes of in-patient care are often used, community living is considered appropriate between such times for most people.

For a number of years there has been a drive to discover community based services that are most suitable for people with serious mental illness. Such services can be broadly grouped as follows:

- alternatives for people who would otherwise be admitted to in-patient beds
- services for people who have been discharged from long-stay hospitals
- routine services for mental health care

These are not mutually exclusive groups, and the area of particular interest here (routine services) draws very much on the innovative services that are now discussed separately. What follows is not a comprehensive analysis of the literature on community mental health services. Rather the focus is on those studies which have included an economic component.

1.3 Alternatives to admission

In the United States seminal work was conducted in Dane County, Wisconsin with the Training in Community Living programme. This was an intensive home-based model of care which focused on the practical needs of patients. Each patient had an individualised programme of care and the aim was to develop the skills necessary for community living. Care was home and workplace based and was assertive (for example, staff would respond immediately if a patient did not attend work). Twenty four hour coverage was provided. The Training in Community Living programme was not simply an alternative to admission although this was undoubtedly a central aim of the service. It was found that this form of care resulted in decreased hospitalisation, more time employed, slightly improved social contacts, greater satisfaction, and less symptomatology (Stein and Test, 1980). This model has been replicated to a greater or lesser extent in a number of other settings.

In Sydney, patients who were referred for psychiatric hospital admission were either randomly allocated to standard care (admission followed by routine after-care) or to the community based service which included 24-crisis care. The patients in the latter group could still be admitted but this was avoided where possible. The community based intervention was 'assertive' in that staff would go and visit patients, and also relatives on whom much focus was placed. As with the Madison model, everyday skills required for effective community living were dealt with. The after-care in the control service was not assertive - patients were not generally visited but were expected to attend community mental health centres. Hoult et al (1984) found that the community alternative to hospital based care was associated with better clinical outcomes and patient satisfaction.

Fenton et al (1979) evaluated a similar service in Montreal. Patients were again randomly allocated to either home based care or to a standard hospital based programme. The model of community provision here appeared less assertive and comprehensive than that employed in Sydney. Outcomes were very similar for the two groups one year after referral.

In London the Daily Living Programme (DLP) was established at the Maudsley Hospital in the late 1980s. This again involved the random allocation of patients facing admission into either a hospital based group or one where alternative community services were provided. The community based service offered continuity of care, crisis intervention, key worker co-ordination, skills training, family support and patient advocacy (Muijen et al, 1992). The hospital based group were offered after-care that consisted mainly of out-patient appointments. Marks et al (1994) found that up to twenty months after entry to the study DLP patients had better outcomes than those randomised to standard care, but after twenty months most gains were lost.

A number of other programmes have been developed within the UK mental health care context. Merson et al (1992) evaluated an "early intervention service" in London. Emergency patients were randomly allocated to this home-based community intervention or to a hospital based service. There was no 24-hour cover but a case-management system was employed. After three months it was found that the community service was associated with improved symptomatology and service satisfaction.

A community service aimed at reducing hospital costs and symptom levels was evaluated in a randomised controlled trial by Tyrer et al (1998). In-patients, when discharged, were allocated to the community team or to a team working from a hospital base. Both teams operated the Care Programme Approach and held regular reviews. The hospital based service led to relatively more admissions than the community service. However, there was no significant difference in symptoms. This study was complicated by the fact that patients were drawn from three areas, one of which had a major bed shortage problem which led to a high level of extra-contractual referrals.

One alternative to hospitalisation for somewhat less severely ill patients is acute day care. Creed et al (1997) carried out a randomised controlled trial evaluating a day hospital in Manchester. Patients were allocated to in-patient care or day care at the time of admission. Clinical and social outcomes showed that both groups improved over time. However, there were no significant differences between the interventions.

1.4 Services for former long-stay patients

It has been believed for some time that long-stay institutional care is not the most appropriate way to treat most people with mental health problems. There has been a steady decrease in the number of people residing in long stay institutions, through patients dying, admissions being reduced and hospitals being closed. However, it has been apparent that alternative service provision for those who would otherwise be in long-stay hospitals has not increased as much as is thought necessary (Thornicroft and Bebbington, 1989). In the UK the most comprehensive evaluation of deinstitutionalisation has been The TAPS Study of the closure of the Friern and Claybury Hospitals and the community care that replaced them (O'Driscoll and Leff, 1993). This study followed up successive cohorts of patients who were discharged from the hospitals. It was found that after one year of living in the community, patients were generally happy to remain in their placement and had social networks that were more varied than a comparison group of patients still in hospital (Anderson et al, 1993). A five year follow up of some of the TAPS patients found gains in terms of neurotic symptoms, verbal and non-verbal behaviour and negative symptoms. The number of people in a person's social network who were considered to be confidants also increased (Leff et al, 1994).

1.5 Routine care for patients with mental health problems

The preceding models of community care have represented a radical departure from traditional interventions. However, most people with mental health problems are *not* long-stay patients requiring rehabilitation in the community, *nor* are they likely to be requiring emergency admission with any great frequency. Instead most patients with severe mental illness will require ongoing care whilst living for most of the time in the community, although it is quite likely that some patients will, in the past, have been in long-stay institutions or will have received emergency interventions. Such ongoing care may include contacts with specific mental health staff (psychiatrists, community mental health nurses, psychologists, occupational therapists, social workers etc), and visits to day care facilities, as well as occasional in-patient stays. In addition there is a whole

plethora of services which, although potentially used by anyone in society, are necessary components of community care. Such services include general health care, legal services, and educational and employment opportunities.

Aspects of innovative services discussed above have been incorporated into routine systems of care. Routine care does not imply homogeneity, as it can be organised and provided in diverse ways. However, one aspect of routine care that has become commonplace is provision within clearly defined geographical sectors in which mental health services are responsible for the psychiatric care of the residing population (Johnson and Thornicroft, 1993). Catchment areas, or sectors, have been developed in North America and Europe since the late 1960s. Prior to this, care was provided on a more individualised basis, with patients being referred by their family doctor to specialists when necessary. The latter did not have overt responsibility to provide services for an entire geographical population.

Strathdee and Thornicroft (1992) have noted that catchment areas have tended to serve populations numbering between 40,000 and 250,000. They point out that the size and location of sectors will be dependent on factors such as existing boundaries for GPs and local government, social deprivation, population distribution, supply of services, and geographical idiosyncrasies. Sectorised mental health care services can potentially lead to a number of advantages over non-sectorised care (Zusman, 1969; Babigian, 1977; Strathdee and Thornicroft, 1992; Thornicroft et al, 1995):

- Access to services may be enhanced because of central provision.
- Continuity of care is ensured as long as the patient stays within the catchment area.
- Care for disadvantaged groups is maintained.
- Responsibility to provide care is identified with a specific service or group of services in an area.
- Provision of a wide range of services is encouraged due to the diverse needs in a population.
- Alternatives to inefficient care need to be sought after because of the requirement to provide care to all patients.

- If other agencies operate within coterminous boundaries then interagency collaboration is enabled.
- Defined catchment areas benefit planning and budgeting.
- Evaluation and research of different forms of care can be readily facilitated if the potential patient population is known *a priori*.

However, there may also be disadvantages with such a way of organising care (Zusman, 1969; Kellett, 1995):

- The drawing of boundaries can deter close working with different agencies if not coterminous.
- The need to provide a general service may work against specialisation and result in mediocrity.
- Incentives to achieve may be reduced if there is no competition between professionals.
- Patient choice can be hindered.

Perhaps the most prevailing argument concerns specialisation verses generalisation. However, the fact that a wide range of services should be provided within a single sector does not necessarily imply that these can not be specialised within themselves. For example, it may be that the sector model is simple a way of co-ordinating different specialised services to the benefit of a specific area.

Although sectorised mental health care is widespread, evaluations of it are not. It is important that assessment is made of this way of organising the provision of care. Such an assessment should include an economic component so that the question of efficiency can be answered.

A UK-based evaluation was undertaken by Burns et al (1993a), who recognised that whilst evaluations of community alternatives to admission had revealed positive results, the successful application of these models into routine care had not been established. Six community teams took part in the study and formed three sectors. One team in each sector provided usual care whilst the other operated a more intensive assessment

service. This was home based, provided assessments within two weeks of referral, and had assessments made by a psychiatrist with another professional. Patients were randomly allocated to the experimental or control condition at referral. Included were those who were likely to be admitted as well as less serious cases. No statistically significant differences were detected between the two modalities in terms of clinical outcome, functioning or satisfaction. Access to services was though greater for the experimental service. The authors suggest that one of the main reasons for this was that their sample consisted of patients with less severe illness than in other studies. The proportion of people with psychotic illness was relatively low, and those that there were had relatively low severity scores.

1.6 Economic evaluation of mental health care services

Economics has been described as the 'dismal science' because it is the study of scarcity. Most people would agree that resources indeed are limited, and this scarcity effects individuals, organisations, and governments alike. It is a fortunate person who is able to purchase all that they desire with the income that they receive, and this also extends beyond the level of an individual. Economics has developed because there is a need to maximise the outcomes that can be achieved by deploying whatever resources are available. This is the essence of economic efficiency. Economists have often been seen as 'cost cutters' when they should have been portrayed (or portrayed themselves) as 'outcome maximisers'.

Nowhere, of course, is the issue of scarce resources more emotive than in the health service. People's lives can be profoundly affected by the amount of health care which is available to them. Because health care is seen to be of great importance the demand for it is generally high, and some would say unlimited. This is increasingly the case, because technological advancement in health care technology means that we can do more now than ever before - a trend which is likely to continue.

Mental health is particularly resource-hungry in relation to other areas. The *Health of the Nation* published in the early 1990s reported that approximately one quarter of

hospital beds were used by people with mental health problems (Department of Health, 1991). Since the 1950s there have been a number of studies devoted to establishing the cost of mental health problems. This was largely due to the fact that they were already perceived to be an expensive group of disorders because of the large number of hospital beds taken up by them (Fein, 1958), and that the indirect costs were likely to be high due to the chronic nature of specific mental health problems meaning that full economic participation would not be recovered in many cases (Malzberg, 1950). In addition, it was important to state the extent of the economic burden of mental illness at a time when the United States, United Kingdom and other Western countries were reducing the emphasis placed on long-stay hospitalisation.

In 1963, the direct costs of mental illness in the UK were estimated to be £122 million (Association of the British Pharmaceutical Industry, 1965). This is equivalent to about £1.5 billion in 1995 prices. However, by the mid-1990s the NHS and local authority costs of mental illness were estimated to be £5.8 billion (Patel and Knapp, 1998). Some of the discrepancy between these two figures will be due to the differing degrees of comprehensiveness. However, it is likely that public awareness of mental health problems and structural changes in the way care is delivered have also led to more resources being directed to this area. The *total* cost of mental illness was estimated by Patel and Knapp (1998) to be £32.1 billion. This figure includes the indirect costs of lost employment (£11.8 billion).

A number of UK studies have examined the costs of a specific types of mental illness. Davies and Drummond (1990) calculated the 1987 costs of schizophrenia to be £1.6 billion. This figure consisted of direct treatment costs of £310 million and lost production amounting to £1.3 billion. The authors then assumed different prevalence rates of schizophrenia, upon which the cost estimates were based, and suggested that the range of total costs could be from £1 billion to £2.7 billion. A higher estimate of the costs of schizophrenia has been made by Knapp (1997). Based on data from the NHS Executive (which identified levels of health expenditure by diagnosis) the 1992/3 direct costs were calculated at £714 million. A similar figure for lost production as that reported by Davies and Drummond (1990) is estimated (£1.2 billion). Along with social security payments the total cost of schizophrenia was calculated to be £2.6. This is

similar to the upper bound of Davies and Drummond (1990) but Knapp suggests that it remains an underestimate due to the omission of family and patient time forgone.

The previous two estimates focused on the number of people with schizophrenia in a given year. An alternative method is to calculate the costs of schizophrenia based on new cases. This *incidence approach* was used by Davies and Drummond (1994) and by Guest and Cookson (1999). Both of these assumed different service profiles for distinct groups of patients, defined according to dependency and episode frequency. Not surprisingly, patients who had a single episode of schizophrenia were the least expensive to care for (in both studies accounting for 1% of the total). However, different group definitions and time-frames make these studies difficult to compare adequately.

Using a top-down prevalence method, Jönsson and Bebbington (1994) estimated the direct cost of depression in the UK to be £222 million (1990 prices). The authors recognised the importance of indirect costs but these were not included. Kind and Sorensen (1993) however arrived at a figure of £416 million for the direct costs of depression - almost double that of Jönsson and Bebbington. They also calculated indirect costs to be £3 billion - seven times greater than the direct costs. Finally, the costs of Alzheimer's Disease have been estimated by Gray and Fenn (1993). They included the main service components of care including that provided by friends and relatives. The total cost in 1990/91 was £1 billion.

These cost of illness estimates vary substantially in their comprehensiveness. What is revealed though is that the economic burden of mental illness is great, particularly if the indirect costs of lost production are included. However, the measurement of the indirect costs of lost production due to morbidity and mortality is particularly controversial. The above studies used the 'human capital approach' which makes the assumption that individuals would be in work if they did not have mental illness and that production is forgone by their being absent from the workforce. However, given that unemployment in many countries is relatively high, a worker who becomes unable to work can be replaced by someone else. Clearly this will happen more quickly in some industries than others. This means that the cost of lost production is confined to the period during which a new employee is recruited. Koopmanschap and van Ineveld (1992)

recommended this 'frictional cost approach'. Using this method they calculated the indirect costs of cardiovascular disease in the Netherlands to be just 8% of the amount calculated using the human capital approach. However, even if it is accepted that the indirect costs reported earlier are overestimates the direct costs alone reveal that mental illness accounts for a high level of resource utilisation. One of the fundamental issues surrounding changes in the way in which mental health care is delivered therefore must be that of cost.

In mental health care there have been a number of economic evaluations of different services (O'Donnell et al, 1992; McCrone and Weich, 1996; Evers et al, 1997; Latimer, 1999; Knapp et al, 1999). One relatively early study was a cost-benefit analysis of the Training in Community Living programme in Madison (Weisbrod et al, 1980). The replications of this model in Montreal (Fenton et al, 1984), Sydney (Hoult et al, 1984) and London (Knapp et al, 1994; Knapp et al, 1998) all included an economic component in their evaluation. The common finding was that, although outcomes were at least similar to those achieved from hospital care, the costs were lower. In this whole area it has been of central importance to evaluate using economic analysis because of the important financial consequences of minimising the use of in-patient treatment, which is one of the main aims of most of these services.

Service provision for patients discharged from long stay hospitals has also been evaluated, although economic assessments have been rare. A study carried out during the late 1960s in Saskatchewan (Cassell et al, 1972) revealed that community care was substantially less expensive than that provided in long-stay institutions. However, service costs were confined to those provided as part of the psychiatric service and did not include accommodation in the community. Community accommodation (whether supported or not) must be included if a comparison with long-stay hospitalisation is to be valid. Muller and Caton (1983) examined the costs of services, including readmission, following hospital discharge in Manhattan. The re-hospitalisation costs accounted for more than one third of the total. However, once again non-hospital accommodation costs were excluded. Another American study did include accommodation costs and still reported a large cost saving for community over institutional care (Murphy and Datel, 1976).

Community care costs in Mannheim, including those attributed to supported housing, were compared to those of continued stay in hospital for patients with schizophrenia by Häfner and an der Heiden (1989). It was found that the former were 43% of the latter. In The TAPS Study, services used whilst patients were in hospital, and then after they had been discharged, were measured and costs were calculated and analysed (Beecham et al, 1997). These were higher after discharge to the community but were greater for those discharged later (indicating that their needs were more complex). This is an important finding because, coupled with the fact that outcomes for patients were better, it shows that good community care is not a cheap option.

Whereas we have seen that a reasonable number of economic evaluations of alternatives to hospitalisation (both acute and long-stay) have taken place, the same phenomenon is not observed for whole systems of 'routine' care. This is unsurprising for two reasons. First, by their very nature innovative models of specific interventions attract most attention of researchers. Second, there are practical deterrents to evaluating mental health systems - particularly cost. However, movement towards the economic evaluation of sectorised care has taken place. Routine mental health service utilisation provided in geographically defined sectors has been measured in the Netherlands (Giel and ten Horn, 1982; Sytema et al, 1989), Italy (Tansella et al, 1986; Sytema et al, 1989), Norway (Lavik, 1983), Germany (ten Horn et al, 1988), and across Scandinavia (Saarento et al, 1995; 1996a; 1996b). These studies have focused on the inputs from psychiatric services, usually provided from hospital sites. They are important because data are available covering clients in contact over a long period of time. However, they are limited in two ways. First, service use which is not related to cost information gives little scope for determining efficiency. Second, concentration on core psychiatric services, whilst organisationally understandable, means that a wide range of health and other services are ignored. Such services may be crucial in affecting the health of the clients concerned.

A small number of studies have though examined the costs of providing mental health services in defined catchement areas. In Spain three contrasting areas were compared by Haro et al (1998). Service use and costs of patients with schizophrenia were measured for a one year period three years after the first contact was made with the psychiatric services. Services were confined to those used specifically because of the patients schizophrenic

illness. The lowest direct costs were in an area where community services were poorly developed - three quarters of the costs were due to in-patient care. The most expensive mean cost was for an area in Barcelona, whilst the third area was a mixed urban and rural region. The authors recognised that one of the main 'cost drivers' was the supply of services. Informal care and lost productivity were also costed and these were shown to vary substantially across the areas. Another study, in Verona, Italy, also focused on new cases of mental illness (Amaddeo et al, 1998). Here costs were measured in the first year following referral. Costs included were for specialised psychiatric services and they were found to differ across diagnostic groups with schizophrenia resulting in the most expensive care packages.

The service use and costs of patients discharged from hospital in Mannheim, Germany, were measured in a study by Salize and Rössler (1996). Costs were confined to the actual psychiatric services that were provided. Sheltered accommodation and in-patient stays both accounted for about one third of the total. In the aforementioned study by Burns et al (1993a), where experimental services were introduced into routine settings, it was found that treatment costs were more than 50% higher for a control condition of standard care (Burns et al, 1993b). This was largely due to reduced levels of in-patient use by the patients in the experimental group.

Finally, Dickey and Scott (1997) compared service use and costs in two catchment areas in different countries - the United States and the UK. Both catchment areas were similar in terms of population and socio-demography, and both also provided community care for people with mental health problems in a routine, ongoing way. Only specific psychiatric services were costed. After standardising for sample differences it was found that the UK sample had a mean cost that was significantly lower than that in the United States. The unadjusted costs did not differ significantly.

To summarise, mental illness accounts for a substantial amount of health care expenditure and there have been a variety of distinct approaches to delivering community based mental health care. Each approach has its own implications for resource utilisation and a growing number of evaluations include an economic component. The study described in this thesis continues this trend.

1.7 Questions addressed in this study

This thesis applies the methods of economic evaluation to two models of sectorised mental health care. One important aspect of this is to use a production function to examine the impact that different services have on patient outcomes. Four specific questions are addressed:

1. What are the costs of sectorised mental health care?
2. Does an intensive model of sectorised mental health result in superior cost-outcome ratios than standard care?
3. What impact do patient characteristics have on service costs?
4. What impact do service costs have on outcome?

2. BACKGROUND TO STUDY

This work is part of the *PRiSM Psychosis Study* of sectorised community mental health care provision which took place between 1992 and 1997. The PRiSM (Psychiatric Research in Service Measurement) Team is part of the Department of Psychiatry at the Institute of Psychiatry, Kings College (University of London). The team has been funded by the Department of Health, and consists of psychiatrists, psychologists, a data manager, a statistician, a health economist, research workers and administrative staff. The evaluation was concerned with the care provided to individuals with severe mental illness (defined here as having a diagnosis of psychosis).

The broad aim (from which the questions posed in Section 1 follow) of the study was to investigate the impact of models of community mental health care, that differed in their intensity, within a whole catchment area. It was recognised that the *efficacy* of community mental health care had been largely established under experimental conditions (in particular randomised controlled trials). What was of interest here was the *effectiveness* of the services when they are provided under routine conditions. The methodology employed was a consequence of addressing these considerations. A randomised controlled trial was not appropriate because under routine conditions only one model would generally be used. Therefore, a 'quasi-experimental' design was adopted whereby two catchment areas each with their own model of care were compared. Many studies have employed a strict inclusion criteria in order to ensure that only those clients at whom the service is specifically targeted are included. However, under routine conditions it is unlikely that such criteria will be feasible and therefore we included clients who were representative of all those with psychosis in the entire catchment area. Finally, we wanted to assess the impact of the community mental health services within the context of the wider array of services. Therefore, we measured the use of services provided by agencies other than the local mental health care Trust.

2.1 Setting

The *PRiSM Psychosis Study* was set in Camberwell, South London (Figure 2.1). At the start of the study this area comprised parts of the London Boroughs of Southwark and Lambeth. According to the 1991 adjusted Jarman scores of social deprivation (Jarman, 1983) the area ranked as the 7th most deprived in the UK. From 1992 the area was divided into five geographical sectors. Two of these were in East Lambeth (Norwood and Brixton) and three were in South Southwark (Nunhead, Peckham, and Camberwell). It was planned that community mental health teams would be developed within each of these five sectors.

PRiSM staff evaluated services in two specific sectors: Nunhead and Norwood. Sociodemographic information describing the population of these two sectors is shown in Table 2.1. These figures are taken from the 1991 census. It is felt that there was some under-enumeration of population figures, possibly due to the Community Charge (Poll Tax). Although it is possible for adjustment to be made (Leese et al, 1995), use of the raw figures should not effect the relative differences between Nunhead and Norwood. The Mental Illness Needs Index (MINI) is a measure of psychiatric need constructed from the census variables included in Table 2.1 excluding those relating to ethnicity (Glover et al, 1998). The national average score is 100. It can be seen that the two sectors in this study are both relatively deprived. Nunhead is also shown to have slightly higher proportions of people in high need categories, which leads to a higher MINI score for that sector. Overall the two sectors are very closely matched on population and socio-demographic characteristics.

2.2 Patient sample

The services that traditionally existed in the area, and those that were subsequently developed following sectorisation, provided care to individuals with a wide range of mental health problems. The *PRiSM Psychosis Study*, as its name suggests, was concerned with care provided to patients with serious and enduring mental health

Figure 2.1. Map of Bethlem and Maudsley NHS Trust catchment area.

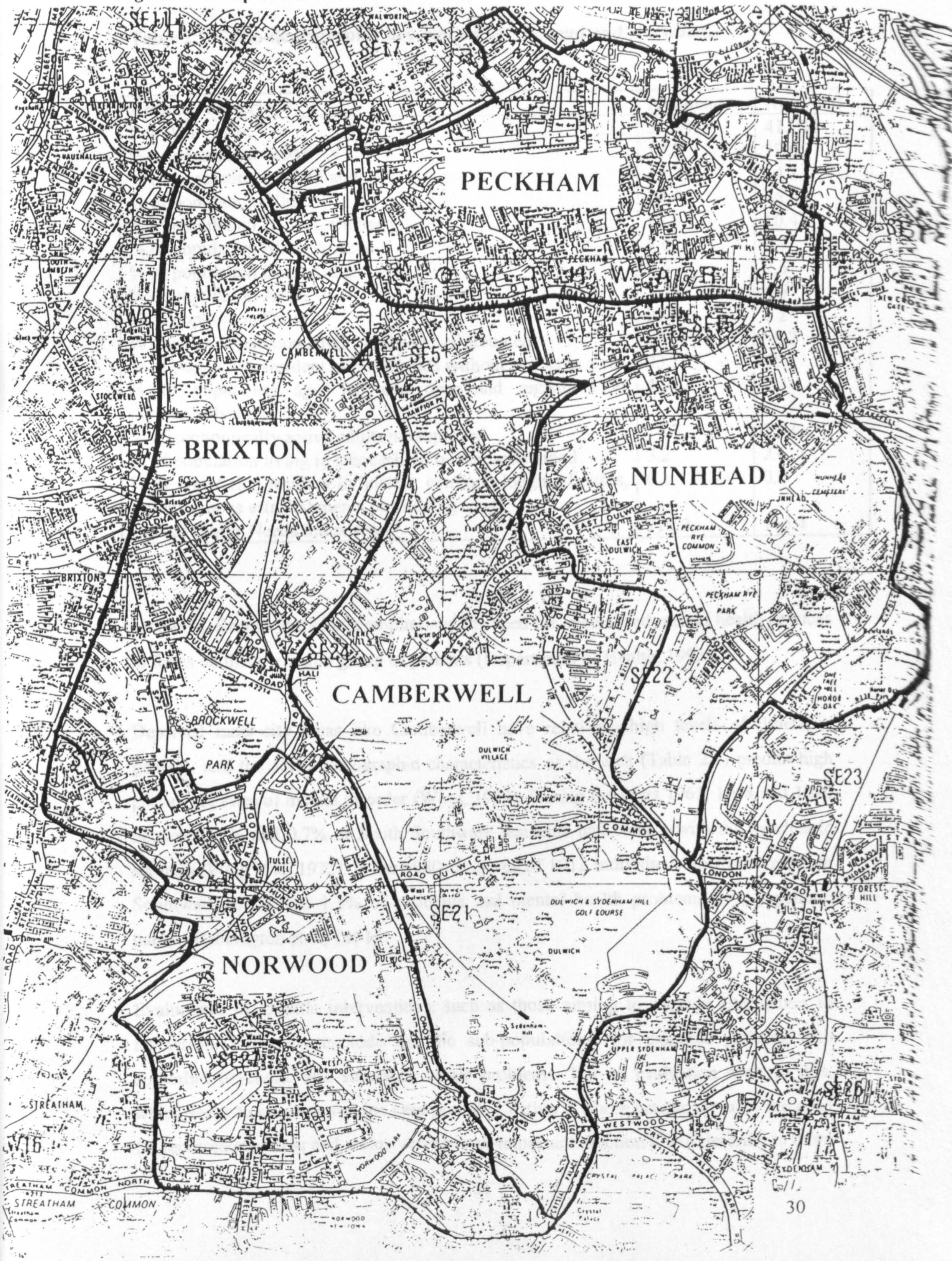

Table 2.1. Socio-demographic description of Nunhead and Norwood.

Area characteristic	Nunhead	Norwood
Population size	38,541	41,734
% of population aged 0-14	17.8	19.0
% of population aged 65 and over	14.3	14.1
% of population White	74.4	76.6
% of population Black Caribbean	12.5	10.4
% of population Black African	5.0	3.7
% of population Black Other	2.5	2.5
% of population Asian	3.7	4.6
% of population Other	2.0	2.2
% of adult population single, widowed or divorced	58.0	58.7
% of population resident in households without access to a car	43.1	41.7
% of population aged 16 and over and registered as permanently sick	4.0	3.8
% of economically active adults unemployed	15.7	15.3
% of population living in a household not self-contained	3.2	2.6
% of population resident in hostels, common lodging houses, miscellaneous establishments or sleeping rough	0.1	0.2
Mental Illness Needs Index score	116.2	115.4

problems. Recent years have emphasised the need for specialised mental health services to focus on this particular group of patients (Department of Health, 1995).

Deprived inner-city areas like Camberwell have relatively high levels of illness in general, and the socio-demographic characteristics of the area (Table 2.1) predict high prevalence rates of mental disorder (Wing, 1989). During the years 1965, 1968 and 1970 between 0.6% and 0.7% of South Southwark residents had contact with the psychiatric services (Wing et al, 1972). In the 1980s a survey of 1012 individuals drawn from South Southwark found that 1.3% of residents had mental health problems of a psychotic nature (Bebbington et al, 1991).

Evaluations of specific interventions, such as those aiming to provide alternatives to admission, frequently exclude specific sub-populations, for example patients with comorbid psychotic and substance abuse problems. For an evaluation such as this, which seeks to examine routine care provided within a whole catchment area, the need for representativeness and inclusiveness is all important. Section 4 will describe in more

detail how this was achieved. First, in Section 3, a description of the services is provided.

3. THE SERVICES

The sectors examined in this study have seen much change in the way in which mental health services have been organised and delivered since the early 1990s. A detailed account of the pre and post intervention services has been provided by Becker et al (1998a). Prior to 1991 the Maudsley and Bethlem 'joint' hospitals were responsible for providing mental health care to South Southwark. These hospitals were also a *Special Health Authority* because of their specialised national services which treated patients from outside the local catchment area. At this time there was no distinction drawn between the different areas within South Southwark in terms of psychiatric services. General medical care was largely organised by the Camberwell Health Authority which also provided psychiatric services for East Lambeth. In April 1991 the Maudsley and Bethlem became responsible for the psychiatric services provided to all of the Camberwell area (South Southwark and East Lambeth), and sectorisation of this larger catchment area began in 1992. However, it was not until approximately two years after this that community mental health teams within the individual sectors (Figure 2.1) were fully operational.

3.1 Nunhead - 'The Intensive Sector'

The intensive service, developed in Nunhead, aimed to provide acute home-based care, alternatives to admission, continuing care, non-hospital beds, and to work closely with other agencies. Table 3.1 shows the main aspects of the Nunhead service both before and after the introduction of sectorised community mental health care. Two separate psychiatric teams were created in the Nunhead sector to facilitate these services. The Psychiatric Acute Care and Emergency team (PACE) was a service dealing with acute problems and crises, and which had a focus on new referrals.

A major aim of the team was to ensure that hospital stays were as short as possible, and co-ordination with hospital wards was crucial in achieving this. Staff had a crisis list of patients who were often visited in their homes. The Psychiatric Assertive Continuing

Table 3.1. Characteristics of Nunhead mental health service before and after the introduction of sectorised community mental health care.

Pre-sectorised community mental health care	Post-sectorised community mental health care
• 36 acute and rehabilitation beds • out-patient and day care provided centrally from the *District Services Centre* • no GP liaison • 1 CPN • access to Maudsley emergency clinic • limited social services input • office hours • large amount of supported housing	• 16 acute and 7 respite beds • day care provided from within the sector • extensive GP liaison • 18.8 CPNs and occupational therapists • access to Maudsley emergency clinic • increased social services input • extended hours • large amount of supported housing

Care Team (PACT) was developed to provide care on a long term continuing basis. (The acronym 'PACT' is more commonly attached to the Stein and Test (1980) model of community care. The service discussed here is called PACT by coincidence, even though it does contain elements of its American namesake). Key elements included needs assessment, care planning, assertive outreach, home-based treatment, day care and rehabilitation services. The PACT team also liaised closely with other local services (particularly housing associations and GPs) and provided mental health training to the police, housing workers and church members. The Nunhead community service was financed mainly by the reduction in the number of hospital beds available to the teams. However, the provision of non-hospital beds (in crisis and respite houses) was very limited due to difficulties in financing the necessary staff.

3.2 Norwood - 'The Standard Sector'

The Norwood service was the comparison condition. Its service changed over time also, however, this was done in a more gradual manner. The service aims in Norwood were to develop a single generic community mental health team, to use the hospital as a key service component, and to make use of other local services where possible. The

characteristics of the Norwood service before and after sectorisation are shown in Table 3.2.

Table 3.2. Characteristics of Norwood mental health service before and after the introduction of sectorised community mental health care.

Pre-sectorised community mental health care	**Post-sectorised community mental health care**
• 19 acute beds • out-patient and day care from hospital sites • 3 CPNs • use of emergency clinic • no GP liaison • limited availability of supported housing • well developed sheltered work scheme • high level of social worker input • office hours	• 19 acute beds • resource centre • 7 CPNs and OTs • use of emergency clinic • some GP liaison • limited availability of supported housing • well developed sheltered work scheme • high level of social worker input office hours

One generic community mental health team was developed and offered case management for those in most need. The team aimed to respond to crises quickly but a specific crisis intervention service was not operated.

To summarise, the intensive sector (Nunhead) was characterised by a substantial decrease in the number of in-patient beds. (It started off with many more than the standard sector and the decrease brought it in line with the latter). At the same time there was a rise in the number of community based staff. The main organisational characteristic was having two teams to provide crisis and continuing care respectively. Change in the standard sector (Norwood) was more modest with no difference in the number of beds, but with an increase in the number of community staff. However, the fact that personnel moved away from the hospital site and into a community mental health centre does indicate that things were still changing in a fundamental way.

Aside from the psychiatric services it is crucial to point out that the sectors differed greatly with regard to the amount of supported housing available, which was much greater in the intensive sector. It will be seen that this has important economic

ramifications. To a lesser extent, there were also differences in social services input, with a greater intensity in the standard sector. Finally, it is helpful to realise that the models of care operated in the two sectors are still in place, reflecting the fact that this was an evaluation of ongoing service provision, and not designed as a time-limited project which might have produced poorly generalisable results.

4. STUDY DESIGN AND PATIENT CHARACTERISTICS

The evaluation of sectorised mental health services was both cross-sectional and longitudinal. It was cross sectional in that the two sectors developed community mental health care in different ways. It was longitudinal because there was a move from predominantly hospital-based services to those which were community-orientated.

4.1 Case identification stage

The first stage of the research was to attempt to identify all annual period prevalent individuals with psychotic conditions living in the study sectors during a given index year. In the intensive sector the index year was 1991-92 whilst in the standard sector it was 1992-93. (It was decided to stagger the data collection exercise so that resources could be focused on one sector at a time. This is the case for the subsequent interview stage also. It is not felt that this has effected the findings to any great degree). Potential cases were identified from a variety of sources: hospital records, GP contacts, social work teams, the police and voluntary organisations. Information from case notes was collected on a case identification schedule, and included: patient characteristics, basic service use during the index year, medication, family history of mental health problems, and physical health problems.

A Global Assessment of Functioning score (American Psychiatric Association, 1987) was given by the member of the research team completing the schedule and was based on casenote information. Clinical diagnosis was collected from casenotes where available to ascertain 'caseness'. In addition a research diagnosis (McGuffin et al, 1991) was generated from casenote information using 'OPCRiT'. It is impossible to ensure that everyone who had severe mental illness was identified. Some people may never have had a contact with any health or other formal service. However, Wing et al (1972) point out that an area with well developed services, such as Camberwell, will have a relatively 'visible' prevalence of mental illness. Missed cases should consequently be

low in number. Nevertheless, a repeat case identification exercise was undertaken approximately two years later to see if any more prevalent cases could be identified.

A total of 535 individuals were identified from the initial case identification exercise. However, 50 (9.3%) of these did not receive a research diagnosis of psychosis and so were removed from the study. (SCAN research diagnoses (World Health Organisation, 1992) were generated from interviews. The criteria for inclusion was that either a SCAN diagnosis or an OPCRIT diagnosis had to reveal psychosis). Another 15 people with psychosis were discovered in the intensive sector and 16 in the standard sector from the repeat case identification exercise. These extra cases were not eligible for interview as the interview sample had already been selected. Therefore, in the results that follow only the original cases are dealt with.

Characteristics of the remaining 485 cases (264 intensive sector, 221 standard sector) are shown in Table 4.1. Most of the sample were white, with about one quarter of Black Caribbean ethnicity. Schizophrenia was the most common clinical diagnosis. Nearly half of the sample had a family history of mental health problems. There was a substantial use of psychiatric services during the case identification index year: one third of clients had been in-patients, whilst three quarters had had out-patient contacts. The average length of time since the first contact with services indicates that this is a group of people with long-term needs. Most people had at some stage been compulsory detained.

Differences between the intensive and standard sectors in terms of patient characteristics were tested for statistical significance using chi-square tests (with Pearson's statistic reported unless otherwise stated) for proportions, with Mann-Whitney tests used for continuous variables (as these were not normally distributed). The Mann-Whitney test compares mean ranks and therefore these figures have been presented along with means and medians.

Table 4.1. Characteristics of clients identified in intensive and standard sectors.

Characteristic	Measure	Intensive sector (n=264)	Standard sector (n=221)	Significance
Age	mean (median) [mean rank]	42.0 (40) [239.0]	43.4 (39) [247.8]	0.494
Female	N (%)	128 (48.5)	118 (53.4)	0.282
Ethnicity	N (%)			0.841
White		165 (63.5)	139 (64.4)	
Black Caribbean		67 (25.8)	56 (25.9)	
Black African		18 (6.9)	11 (5.1)	
Other		10 (3.8)	10 (4.6)	
Born outside of UK	N (%)	72 (28.7)	63 (29.9)	0.783
Marital status	N (%)			0.284
single		148 (59.0)	113 (52.6)	
married or cohabiting		60 (23.9)	54 (25.1)	
divorced, widowed or separated		43 (17.1)	48 (22.3)	
Ever been married	N (%)	101 (40.6)	90 (44.3)	0.419
Children	N (%)	107 (42.6)	101 (47.9)	0.260
Employment (including voluntary work) in index year	N (%)	30 (15.5)	28 (14.1)	0.696
Capable of open employment	N (%)	74 (44.8)	60 (33.5)	0.031
Clinical diagnosis	N (%)			0.037
schizophrenia		153 (58.0)	108 (48.9)	
bipolar disorder		60 (22.7)	49 (22.2)	
other psychosis		51 (19.3)	64 (29.0)	
Family history of mental health problems	N (%)	90 (42.3)	83 (44.1)	0.702
Living with others during index year	N (%)	155 (68.0)	105 (51.0)	<0.001
Living in supported accommodation during index year	N (%)	45 (22.3)	26 (12.0)	0.005
Number of years since first psychiatric service contact	mean (median) [mean rank]	16.5 (13) [241.0]	14.7 (12) [222.8]	0.147
Number of lifetime admissions	mean (median) [mean rank]	4.6 (3) [214.0]	4.5 (3) [207.5]	0.585

Table 4.1. (continued)

Characteristic	Measure	Intensive sector (n=264)	Standard sector (n=221)	Significance
Admissions per year	mean (median) [mean rank]	0.4 (0.3) [203.9]	0.5 (0.3) [208.6]	0.687
Ever in hospital for more than one year	N (%)	38 (17.3)	16 (8.5)	0.009
In-patient in index year	N (%)	93 (35.2)	81 (36.7)	0.745
Number of admissions in index year	mean (median) [mean rank]	0.5 (0) [242.9]	0.5 (0) [243.1]	0.987
Total length of stay in index year	mean (median) [mean rank]	30.7 (0) [245.0]	23.1 (0) [240.6]	0.691
Out-patient contact in index year	N (%)	182 (75.8)	160 (72.4)	0.340
CPN contact in index year	N (%)	57 (21.6)	57 (29.2)	0.061
Day patient in index year	N (%)	72 (27.6)	31 (14.5)	0.001
Consultant domiciliary visit in index year	N (%)	60 (22.7)	49 (22.6)	0.970
Emergency clinic attendance in index year	N (%)	69 (31.1)	54 (24.7)	0.133
Received ECT in index year	N (%)	4 (1.8)	5 (2.3)	0.747 [1]
Ever violent	N (%)	110 (47.8)	68 (35.6)	0.012
Staff concern about violence	N (%)	43 (19.5)	17 (8.8)	0.002
Ever convicted of or charged with a criminal offence	N (%)	72 (29.8)	44 (21.1)	0.035
Ever in prison	N (%)	47 (19.4)	29 (13.6)	0.098
Never considered a suicide risk	N (%)	111 (55.0)	119 (63.6)	0.082
Ever admitted under Mental Health Act	N (%)	139 (63.5)	113 (62.8)	0.887
Global Assessment of Functioning	mean (median) [mean rank]	56.1 (60) [184.8]	59.8 (60) [208.4]	0.039

Tests for significant differences in proportions performed using Chi-square tests with Pearson's statistic except for cases indicated by [1] where Fisher's exact test was used. Tests for significant differences in continuous variables performed using Mann Whitney tests.

There was a statistically significant (here defined as a p value below 0.05)[1] difference between the two sectors for clinical diagnosis, with the intensive sector having a higher proportion of people with schizophrenia and the standard sector having a greater proportion in the 'other psychoses' category. A significantly higher proportion of people in the intensive sector lived in supported accommodation during the index year ('living with others' is in part measuring the same thing). In Section 3 it was pointed out that the intensive sector had greater provision of supported accommodation, and it is likely that the figures here represent a 'supply-side effect' where the supply of a service generates utilisation of it. A significantly higher proportion of intensive sector clients used day hospital services during the index year - again a potential supply-side effect given that the District Services Centre (a long-term day hospital) served the intensive sector clients, whilst St Giles Day Hospital, which was less well resourced, catered for those in the standard sector. There was a significantly greater proportion of intensive sector clients who had at some time been an in-patient in excess of twelve months. Figures for lifetime violence, staff concerns about violence and criminal convictions show that this was significantly more of an issue in the intensive sector than the standard sector. Finally, the Global Assessment of Functioning (GAF) score reveals that functioning in the intensive sector was significantly lower than in the standard sector. (Higher GAF scores represent better levels of functioning).

This is not a randomised controlled trial (RCT) and although the two areas were well matched in terms of population and socio-demographic characteristics it was likely that some differences in client characteristics would exist. Also the large number of variables examined in Table 4.1 means that some statistically significant differences could be found by chance alone, and this would be possible with a randomised design also. However, the differences that were significant imply that the intensive sector clients were functioning less well and had more challenging issues to deal with. This view is reinforced if the higher use of day hospital care and supported accommodation reflect higher needs and not just a supply-side effect. Identification of such differences is vital when considering the cost and outcome findings to be discussed later.

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[1] See discussion of p-values on pages 63-65.

4.2 Interview stage

The second stage of the research was to conduct patient interviews with a random selection of all identified cases. These interviews took place at two points in time: prior to the establishment of community mental health teams (baseline), and then after the teams had been delivering services for approximately two and a half years (follow-up). It was not necessarily the case that all of the sample would be using mental health services – the entry criteria was that they must be resident in the sector and have a psychotic diagnosis. The interviews in the intensive sector were carried out prior to those in the standard sector. Clients were interviewed regardless of where they were living at the time (within practical limits) as long as they had been resident in one of the two sectors during the case identification year. Also they could be interviewed at follow-up even if they had not been seen at baseline.

The patient interviews used a number of different instruments and schedules:

- CAN - Camberwell Assessment of Need (Phelan et al, 1995; Slade et al, 1999): This instrument aims to identify needs in 22 specific areas. Each area is rated as zero (no need), one (a need exists but it is met) or two (a need exists but it remains unmet). Summary scores reveal the total number of needs, the number of met needs and the number of unmet needs.

- LQOLP - Lancashire Quality of Life Profile (Oliver, 1991): The LQOLP covers a number of aspects of life. Many of the questions ask for the client to state how they feel about a particular situation, with ratings going from one (can't be worse) to seven (can't be better). An average of these ratings give the perceived quality of life. In addition the interviewer asks the client to indicate on a 'ladder' the point which represents their quality of life on that day. The interviewer makes a similar rating, on a horizontal axis, of how they see the client's quality of life.

- SNS - Social Network Scale (Leff et al, 1990): The names of individuals whom the client knows are recorded and categorised. The total number of names in an individual's network can be used as a summary score.

- VSSS - Verona Service Satisfaction Scale (Ruggeri and Dall'Agnola, 1993): The VSSS used contained 57 items connected with services. The client was asked to give a rating from a five point scale concerning how they felt about each particular area. The scale was coded between one (terrible) and five (excellent). A global score is calculated by taking the mean of the scores for the individual items.

- CSRI - Client Service Receipt Interview (Beecham and Knapp, 1992): Used for the collection of service use and other data necessary for the calculation of costs.

- PHI - Physical Health Index (not published, but see O'Driscoll, C and Leff, J. (1993) for a summary): Patients are asked whether they have specific physical health problems and if so whether they are receiving treatment.

- PSDQ – PRiSM Social Demographic Questionnaire (unpublished): This schedule was used to collect information about the patient's children, language, accommodation, education, time spent in different activities, housework, occupation, parents' occupation, early life, childhood illnesses, forensic history (including being a victim of crime), smoking and suicide attempts.

Staff interviews were also conducted at both points in time with the following instruments:

- BPRS - Brief Psychiatric Rating Scale (Overall and Gorham, 1962): The BPRS consists of 24 individual items relating to symptomatology. These are rated between one (symptom not present) to seven (symptom extremely severe). The individual scores can be summed to generate a total score.

- GAF - Global Assessment of Functioning (American Psychiatric Association, 1987): The GAF allows a key-worker rating to be made of a patients symptomatology and functioning. Ratings are between zero and 90. A third rating is made of symptomatology and functioning combined.

- SBS - Social Behaviour Scale (Wykes and Sturt, 1986): This consists of 21 areas of social behaviour which are generally rated between zero (no problem) and four, although some items are rated only as high as two or three. A total SBS score is calculated by summing across the individual items.

- CAN - Camberwell Assessment of Need (Phelan et al, 1995): The staff version of the CAN is rated in the same way as the user version.

Finally interviews with informal carers were undertaken using the:

- RBQ - Relative Burden Questionnaire (unpublished): This was used at baseline only. Relatives are asked about how they feel about caring for the patient with regard to the following domains: self-care, household chores, money, child care, socially embarrassing behaviour, other behaviour and general supervision.

- ECI - Experience of Care-Giving Inventory (Szmukler et al, 1996): This was used at follow-up only. It consists of 66 aspects of care-giving. Respondents state how much they have experienced each aspect. Five ratings are possible: never, rarely, sometimes, often or nearly always.

- GHQ 28 - General Health Questionnaire (28 item version) (Goldberg and Williams, 1988): This instrument is used to detect psychiatric morbidity by asking respondents about different aspects of their health.

Of particular relevance to this work was the Client Service Receipt Interview (CSRI) which recorded service use data and enabled service costs to be calculated. For clients with a research diagnosis of psychosis there were 203 CSRIs completed at baseline (97 in the intensive sector and 106 in the standard sector) and 169 at follow-up (83 in the intensive sector and 86 in the standard sector). The number of clients interviewed at both points in time was 146 (73 in each sector). Although the random selection of cases should have ensured that a representative group of clients in each sector was interviewed it was important to verify this. The reasons for not being interviewed at baseline and follow-up respectively were: refusal to be interviewed (25.6%, 22.8%), the client being

unobtainable (5.0%, 14.4%), client being deceased (1.6%, 6.3%) and for other reasons (1.9%, 2.2%). These figures are based on all the completed CSRIs, including those for whom a research diagnosis of psychosis was not given (eight at baseline and five at follow-up).

4.2.1 Comparison between patients interviewed and all other patients

Tables 4.2 and 4.3 compare the characteristics of those interviewed at baseline and follow-up with those not interviewed. The latter group includes those not selected for interview and those selected but not interviewed for the above reasons. The characteristics in the tables were recorded at the case identification stage. It can be seen that the baseline interview sample is very representative of all identified cases, with only three significant differences ($p<0.05$) for the 33 characteristics examined (Table 4.2). The interviewed sample contained a greater proportion of clients who were widowed, divorced or separated than the non-interviewed sample; a lower proportion in employment; and a higher proportion who had been convicted of a criminal offence at some time. The greater tendency for the non-interviewed sample to be in employment might be because those employed could be more likely to refuse to be interviewed (due to lack of time). However, of the 66 who did refuse at baseline, only seven (11%) were employed during the index year. The other two significant differences do not lend themselves to straightforward interpretations. The clients interviewed at follow-up (Table 4.3) differed significantly from those not interviewed with regard to marital status, employment, and capability of employment (a view made by the researcher collecting data from case notes). Overall, the representativeness was largely maintained over time.

4.2.2 Comparison between interviewed patients who 'stayed' and all other patients

Some of the analyses reported in this next section refer to a smaller sub-sample consisting of clients interviewed at baseline and follow-up who either remained resident in their original sector at both time points or who had moved but still received care from these sector teams. The number of clients in this group was 123 (62 from the intensive sector and 61 from the standard sector). In Tables 4.4 and 4.5 the characteristics of these clients are compared to all other clients from the relevant sector.

In the intensive sector (Table 4.4) clients who were interviewed twice and remained in the sector were considered by the rater to be significantly less capable of open employment than all other intensive sector clients. A significantly greater proportion had been day-patients during the index year and had lived in supported accommodation. They had also been in contact with services longer and had had more admissions, although the intensity of admissions was not significantly different.

Clients interviewed twice and who remained in the standard sector (Table 4.5) were more likely than other standard sector clients to be widowed or divorced or separated. A significantly lower proportion lived in supported accommodation during the index year. The low level of supported accommodation available in the standard sector might have led former residents to move into other areas, thus removing them from this sample. A significantly higher proportion of the final sample had had criminal charges or convictions, and had been in prison. A (marginally) significantly lower proportion had been detained at some time under the Mental Health Act. Finally, and most importantly, the level of functioning of those staying in the standard sector who were interviewed twice was significantly higher than other standard sector clients.

4.2.3 Comparison between intensive sector and standard sector patients who 'stayed'

It is important to compare the two sectors in the reduced sub-sample of twice interviewed 'stayers'. A comparison of Table 4.6 and Table 4.1 reveals that a number of significant differences between the sectors, when all identified cases were considered, remained different for the reduced sample. The significance of the difference increased for two characteristics: living in supported accommodation during the index year and functioning. These increases are because of the differences reported in Table 4.5 where the standard sector 'final' sample had higher social functioning and a lower proportion of people in supported accommodation than all other standard sector clients. Significance levels were noticeably reduced for four characteristics (living with others during the index year, proportion of people who had a length of stay of more than one year, proportion being a day patient during the index year, and the proportion who had ever been violent). Clinical diagnosis differed significantly between the sectors for the identified sample but not for the 'final' sample.

Table 4.2. Characteristics of clients interviewed at baseline compared to clients not interviewed.

Characteristic	Measure	Interviewed (n=203)	Not interviewed (n=282)	Significance
Age	mean (median) [mean rank]	42.6 (40) [243.8]	42.6 (40) [242.4]	0.911
Female	N (%)	97 (47.8)	149 (52.8)	0.272
Ethnicity	N (%)			0.974
White		132 (65.0)	172 (63.0)	
Black Caribbean		51 (25.1)	72 (26.4)	
Black African		12 (5.9)	17 (6.2)	
Other		8 (3.9)	12 (4.4)	
Born outside of UK	N (%)	55 (27.1)	80 (30.9)	0.373
Marital status	N (%)			0.008
single		114 (56.4)	147 (55.7)	
married or cohabiting		38 (18.8)	76 (28.8)	
divorced, widowed or separated		50 (24.8)	41 (15.5)	
Ever been married	N (%)	81 (41.5)	110 (42.8)	0.788
Children	N (%)	87 (43.1)	121 (46.5)	0.457
Employment (including voluntary work) in index year	N (%)	17 (10.4)	41 (18.1)	0.035
Capable of open employment	N (%)	51 (36.7)	83 (40.5)	0.479
Clinical diagnosis	N (%)			0.922
schizophrenia		108 (53.2)	153 (54.3)	
bipolar disorder		45 (22.2)	64 (22.7)	
other psychosis		50 (24.6)	65 (23.0)	
Family history of mental health problems	N (%)	75 (45.2)	98 (41.7)	0.489
Living with others during index year	N (%)	108 (57.1)	152 (62.0)	0.302
Living in supported accommodation during index year	N (%)	35 (18.1)	36 (16.0)	0.562
Number of years since first psychiatric service contact	mean (median) [mean rank]	16.8 (14) [242.5]	14.9 (12) [226.1]	0.193
Number of lifetime admissions	mean (median) [mean rank]	4.9 (4) [220.7]	4.3 (3) [204.4]	0.174

Table 4.2. (continued)

Characteristic	Measure	Interviewed (n=203)	Not interviewed (n=282)	Significance
Admissions per year [1]	mean (median) [mean rank]	0.5 (0.3) [212.2]	0.4 (0.3) [201.8]	0.385
Ever in hospital for more than one year	N (%)	21 (12.4)	33 (13.8)	0.697
In-patient in index year	N (%)	73 (36.0)	101 (35.8)	0.974
Number of admissions in index year	mean (median) [mean rank]	0.5 (0) [244.3]	0.5 (0) [242.1]	0.839
Total length of stay in index year	mean (median) [mean rank]	24.7 (0) [241.4]	29.1 (0) [244.1]	0.805
Out-patient contact in index year	N (%)	149 (77.6)	193 (71.7)	0.157
CPN contact in index year	N (%)	40 (21.1)	74 (27.5)	0.115
Day patient in index year	N (%)	47 (23.6)	56 (20.3)	0.385
Consultant domiciliary visit in index year	N (%)	46 (22.9)	63 (22.5)	0.921
Emergency clinic attendance in index year	N (%)	46 (25.0)	77 (30.0)	0.252
Received ECT in index year	N (%)	4 (2.2)	5 (1.9)	1.000 [1]
Ever violent	N (%)	72 (40.9)	106 (43.3)	0.630
Staff concern about violence	N (%)	23 (13.5)	37 (15.2)	0.613
Ever convicted of or charged with a criminal offence	N (%)	61 (30.5)	55 (21.9)	0.038
Ever in prison	N (%)	34 (16.9)	42 (16.5)	0.914
Never considered a suicide risk	N (%)	75 (46.0)	84 (37.2)	0.080
Ever admitted under Mental Health Act	N (%)	105 (62.1)	147 (63.9)	0.715
Global Assessment of Functioning	mean (median) [mean rank]	58.5 (60) [200.0]	57.3 (60) [192.1]	0.488

Tests for significant differences in proportions performed using Chi-square tests with Pearson's statistic except for cases indicated by [1] where Fisher's exact test was used. Tests for significant differences in continuous variables performed using Mann Whitney tests.

Table 4.3. Characteristics of clients interviewed at follow-up compared to clients not interviewed.

Characteristic	Measure	Interviewed (n=169)	Not interviewed (n=316)	Significance
Age	mean (median) [mean rank]	41.9 (40) [239.3]	43.0 (40) [245.0]	0.673
Female	N (%)	85 (50.3)	161 (50.9)	0.891
Ethnicity	N (%)			0.803
White		107 (63.7)	197 (64.0)	
Black Caribbean		46 (27.4)	77 (25.0)	
Black African		8 (4.8)	21 (6.8)	
Other		7 (4.2)	13 (4.2)	
Born outside of UK	N (%)	44 (26.2)	91 (31.0)	0.279
Marital status	N (%)			0.024
single		93 (55.0)	168 (56.6)	
married or cohabiting		33 (19.5)	81 (27.3)	
divorced, widowed or separated		43 (25.4)	48 (16.2)	
Ever been married	N (%)	70 (42.9)	121 (41.9)	0.824
Children	N (%)	72 (43.4)	136 (45.9)	0.594
Employment (including voluntary work) in index year	N (%)	14 (10.1)	44 (17.5)	0.049
Capable of open employment	N (%)	37 (31.6)	97 (42.7)	0.045
Clinical diagnosis	N (%)			0.835
schizophrenia		94 (55.6)	167 (52.8)	
bipolar disorder		36 (21.3)	73 (23.1)	
other psychosis		39 (23.1)	76 (24.1)	
Family history of mental health problems	N (%)	64 (47.8)	109 (40.8)	0.186
Living with others during index year	N (%)	88 (55.3)	172 (62.5)	0.140
Living in supported accommodation during index year	N (%)	28 (17.3)	43 (16.8)	0.897
Number of years since first psychiatric service contact	mean (median) [mean rank]	16.0 (13) [238.7]	15.5 (12) [230.0]	0.504
Number of lifetime admissions	mean (median) [mean rank]	5.0 (4) [221.9]	4.3 (3) [205.6]	0.193

Table 4.3. (continued)

Characteristic	Measure	Interviewed (n=169)	Not interviewed (n=316)	Significance
Admissions per year	mean (median) [mean rank]	0.5 (0.3) [211.5]	0.4 (0.3) [203.3]	0.509
Ever in hospital for more than one year	N (%)	19 (13.9)	35 (12.9)	0.778
In-patient in index year	N (%)	57 (33.7)	117 (37.0)	0.471
Number of admissions in index year	mean (median) [mean rank]	0.5 (0) [238.5]	0.5 (0) [245.4]	0.541
Total length of stay in index year	mean (median) [mean rank]	24.6 (0) [236.1]	28.7 (0) [246.7]	0.354
Out-patient contact in index year	N (%)	122 (74.8)	220 (73.8)	0.811
CPN contact in index year	N (%)	35 (22.3)	79 (26.2)	0.363
Day patient in index year	N (%)	42 (25.3)	61 (19.7)	0.161
Consultant domiciliary visit in index year	N (%)	38 (22.6)	71 (22.7)	0.987
Emergency clinic attendance in index year	N (%)	37 (24.2)	86 (29.9)	0.206
Received ECT in index year	N (%)	0 (0.0)	9 (3.1)	0.031 [1]
Ever violent	N (%)	59 (39.6)	119 (43.8)	0.410
Staff concern about violence	N (%)	18 (12.4)	42 (15.6)	0.378
Ever convicted of or charged with a criminal offence	N (%)	49 (29.7)	67 (23.4)	0.142
Ever in prison	N (%)	30 (18.1)	46 (15.9)	0.553
Never considered a suicide risk	N (%)	57 (43.8)	102 (39.4)	0.398
Ever admitted under Mental Health Act	N (%)	81 (59.1)	171 (65.3)	0.227
Global Assessment of Functioning	mean (median) [mean rank]	58.1 (60) [196.8]	57.6 (60) [194.8]	0.867

Tests for significant differences in proportions performed using Chi-square tests with Pearson's statistic except for cases indicated by [1] where Fisher's exact test was used. Tests for significant differences in continuous variables performed using Mann Whitney tests.

Table 4.4. Characteristics of intensive sector clients interviewed at baseline and follow-up who remained within sector compared to all other intensive sector clients.

Characteristic	Measure	Interviewed (n=62)	Not interviewed (n=202)	Significance
Age	mean (median) [mean rank]	43.1 (42) [141.0]	41.6 (40) [130.0]	0.317
Female	N (%)	28 (45.2)	100 (49.5)	0.549
Ethnicity	N (%)			0.865
White		40 (64.5)	125 (63.1)	
Black Caribbean		16 (25.8)	51 (25.8)	
Black African		3 (4.8)	15 (7.6)	
Other		3 (4.8)	7 (3.5)	
Born outside of UK	N (%)	17 (27.4)	55 (29.1)	0.800
Marital status	N (%)			0.857
single		36 (58.1)	112 (59.3)	
married or cohabiting		14 (22.6)	46 (24.3)	
divorced, widowed or separated		12 (19.4)	31 (16.4)	
Ever been married	N (%)	25 (41.0)	76 (40.4)	0.939
Children	N (%)	26 (41.9)	81 (42.9)	0.899
Employment (including voluntary work) in index year	N (%)	4 (8.9)	26 (17.6)	0.159
Capable of open employment	N (%)	10 (28.6)	64 (49.2)	0.029
Clinical diagnosis	N (%)			0.342
schizophrenia		39 (62.9)	114 (56.4)	
bipolar disorder		15 (24.2)	45 (22.3)	
other psychosis		8 (12.9)	43 (21.3)	
Family history of mental health problems	N (%)	24 (49.0)	66 (40.2)	0.277
Living with others during index year	N (%)	39 (68.4)	116 (67.8)	0.935
Living in supported accommodation during index year	N (%)	18 (31.0)	27 (18.8)	0.058
Number of years since first psychiatric service contact	mean (median) [mean rank]	19.4 (16.5) [150.2]	15.6 (12) [125.0]	0.022

Table 4.4. (continued)

Characteristic	Measure	Interviewed (n=62)	Not interviewed (n=202)	Significance
Number of lifetime admissions	mean (median) [mean rank]	5.5 (4.5) [133.1]	4.3 (3) [109.1]	0.026
Admissions per year	mean (median) [mean rank]	0.4 (0.3) [119.4]	0.4 (0.3) [112.6]	0.529
Ever in hospital for more than one year	N (%)	10 (20.8)	28 (16.3)	0.460
In-patient in index year	N (%)	19 (30.6)	74 (36.6)	0.388
Number of admissions in index year	mean (median) [mean rank]	0.5 (0) [129.0]	0.5 (0) [133.6]	0.624
Total length of stay in index year	mean (median) [mean rank]	22.1 (0) [124.5]	33.3 (0) [135.0]	0.270
Out-patient contact in index year	N (%)	44 (74.6)	138 (76.2)	0.795
CPN contact in index year	N (%)	9 (14.5)	48 (23.8)	0.122
Day patient in index year	N (%)	25 (40.3)	47 (23.6)	0.010
Consultant domiciliary visit in index year	N (%)	15 (24.2)	45 (22.3)	0.753
Emergency clinic attendance in index year	N (%)	11 (22.4)	58 (33.5)	0.139
Received ECT in index year	N (%)	0 (0.0)	4 (2.3)	0.577 [1]
Ever violent	N (%)	26 (49.1)	84 (47.5)	0.838
Staff concern about violence	N (%)	10 (19.6)	33 (19.5)	0.990
Ever convicted of or charged with a criminal offence	N (%)	21 (33.9)	51 (28.3)	0.411
Ever in prison	N (%)	11 (17.7)	36 (20.0)	0.698
Never considered a suicide risk	N (%)	24 (53.3)	67 (42.7)	0.205
Ever admitted under Mental Health Act	N (%)	33 (67.3)	106 (62.4)	0.522
Global Assessment of Functioning	mean (median) [mean rank]	56.3 (55) [105.9]	56.1 (60) [107.4]	0.879

Tests for significant differences in proportions performed using Chi-square tests with Pearson's statistic except for cases indicated by [1] where Fisher's exact test was used. Tests for significant differences in continuous variables performed using Mann Whitney tests.

Table 4.5. Characteristics of standard sector clients interviewed at baseline and follow-up who remained within sector compared to all other standard sector clients.

Characteristic	Measure	Interviewed (n=61)	Not interviewed (n=160)	Significance
Age	mean (median) [mean rank]	42.5 (38) [109.6]	43.7 (40.5) [111.5]	0.838
Female	N (%)	31 (50.8)	87 (54.4)	0.636
Ethnicity	N (%)			0.878
White		37 (60.7)	102 (65.8)	
Black Caribbean		17 (27.9)	39 (25.2)	
Black African		4 (6.6)	7 (4.5)	
Other		3 (4.9)	7 (4.5)	
Born outside of UK	N (%)	17 (27.9)	46 (30.7)	0.687
Marital status	N (%)			0.010
single		31 (50.8)	82 (53.2)	
married or cohabiting		9 (14.8)	45 (29.2)	
divorced, widowed or separated		21 (34.4)	27 (17.5)	
Ever been married	N (%)	27 (46.6)	63 (43.4)	0.688
Children	N (%)	27 (45.0)	74 (49.0)	0.599
Employment (including voluntary work) in index year	N (%)	6 (10.3)	22 (15.7)	0.324
Capable of open employment	N (%)	19 (38.0)	41 (31.8)	0.429
Clinical diagnosis	N (%)			0.462
schizophrenia		33 (54.1)	75 (46.9)	
bipolar disorder		14 (23.0)	35 (21.9)	
other psychosis		14 (23.0)	50 (31.3)	
Family history of mental health problems	N (%)	23 (46.9)	60 (43.2)	0.647
Living with others during index year	N (%)	25 (41.0)	80 (55.2)	0.063
Living in supported accommodation during index year	N (%)	2 (3.3)	24 (15.5)	0.013
Number of years since first psychiatric service contact	mean (median) [mean rank]	15.5 (12) [109.0]	14.3 (12) [100.0]	0.330

Table 4.5. (continued)

Characteristic	Measure	Interviewed (n=61)	Not interviewed (m=160)	Significance
Number of lifetime admissions	mean (median) [mean rank]	4.1 (3) [98.6]	4.7 (3) [97.1]	0.859
Admissions per year	mean (median) [mean rank]	0.4 (0.3) [87.7]	0.5 (0.3) [94.5]	0.432
Ever in hospital for more than one year	N (%)	2 (4.2)	14 (9.9)	0.367 [1]
In-patient in index year	N (%)	20 (32.8)	61 (38.1)	0.462
Number of admissions in index year	mean (median) [mean rank]	0.4 (0) [106.4]	0.5 (0) [112.8]	0.436
Total length of stay in index year	mean (median) [mean rank]	14.9 (0) [104.9]	26.3 (0) [113.3]	0.310
Out-patient contact in index year	N (%)	49 (80.3)	111 (69.4)	0.103
CPN contact in index year	N (%)	15 (27.3)	42 (30.0)	0.706
Day patient in index year	N (%)	8 (13.6)	23 (14.8)	0.812
Consultant domiciliary visit in index year	N (%)	12 (20.0)	37 (23.6)	0.574
Emergency clinic attendance in index year	N (%)	13 (21.3)	41 (25.9)	0.475
Received ECT in index year	N (%)	0 (0.0)	5 (3.2)	0.201 [1]
Ever violent	N (%)	16 (30.2)	52 (37.7)	0.333
Staff concern about violence	N (%)	5 (9.3)	12 (8.6)	0.879
Ever convicted of or charged with a criminal offence	N (%)	18 (30.5)	26 (17.3)	0.035
Ever in prison	N (%)	13 (21.7)	16 (10.5)	0.032
Never considered a suicide risk	N (%)	20 (408.8)	48 (34.8)	0.451
Ever admitted under Mental Health Act	N (%)	27 (51.9)	86 (67.2)	0.055
Global Assessment of Functioning	mean (median) [mean rank]	63.8 (65) [104.9]	58.3 (60) [82.8]	0.009

Tests for significant differences in proportions performed using Chi-square tests with Pearson's statistic except for cases indicated by [1] where Fisher's exact test was used. Tests for significant differences in continuous variables performed using Mann Whitney tests.

Table 4.6. Comparison of intensive and standard sector clients who were interviewed at baseline and follow-up and who remained within sector.

Characteristic	Measure	Intensive sector (n=62)	Standard sector (n=61)	Significance
Age	mean (median) [mean rank]	43.1 (42) [63.8]	42.5 (38) [60.1]	0.566
Female	N (%)	28 (45.2)	31 (50.8)	0.530
Ethnicity	N (%)			0.963
White		40 (64.5)	37 (60.7)	
Black Caribbean		16 (25.8)	17 (27.9)	
Black African		3 (4.8)	4 (6.6)	
Other		3 (4.8)	3 (4.9)	
Born outside of UK	N (%)	17 (27.4)	17 (27.9)	0.956
Marital status	N (%)			0.142
single		36 (58.1)	31 (50.8)	
married or cohabiting		14 (22.6)	9 (14.8)	
divorced, widowed or separated		12 (19.4)	21 (34.4)	
Ever been married	N (%)	25 (41.0)	27 (46.6)	0.540
Children	N (%)	26 (41.9)	27 (45.0)	0.733
Employment (including voluntary work) in index year	N (%)	4 (8.9)	6 (10.3)	0.804
Capable of open employment	N (%)	10 (28.6)	19 (38.0)	0.367
Clinical diagnosis	N (%)			0.339
schizophrenia		39 (62.9)	33 (54.1)	
bipolar disorder		15 (24.2)	14 (23.0)	
other psychosis		8 (12.9)	14 (23.0)	
Family history of mental health problems	N (%)	24 (49.0)	23 (46.9)	0.840
Living with others during index year	N (%)	39 (68.4)	25 (41.0)	0.003
Living in supported accommodation during index year	N (%)	18 (31.0)	2 (3.3)	<0.001
Number of years since first psychiatric service contact	mean (median) [mean rank]	19.4 (16.5) [65.4]	15.5 (12) [54.1]	0.075

Table 4.6. (continued)

Characteristic	Measure	Interviewed (n=62)	Not interviewed (n=61)	Significance
Number of lifetime admissions	mean (median) [mean rank]	5.5 (4.5) [57.9]	4.1 (3) [46.2]	0.045
Admissions per year	mean (median) [mean rank]	0.4 (0.3) [53.2]	0.4 (0.3) [48.2]	0.398
Ever in hospital for more than one year	N (%)	10 (20.8)	2 (4.2)	0.014
In-patient in index year	N (%)	19 (30.6)	20 (32.8)	0.799
Number of admissions in index year	mean (median) [mean rank]	0.5 (0) [62.4]	0.4 (0) [61.6]	0.888
Total length of stay in index year	mean (median) [mean rank]	22.1 (0) [62.1]	14.9 (0) [61.9]	0.965
Out-patient contact in index year	N (%)	44 (74.6)	49 (80.3)	0.451
CPN contact in index year	N (%)	9 (14.5)	15 (27.3)	0.088
Day patient in index year	N (%)	25 (40.3)	8 (13.6)	0.001
Consultant domiciliary visit in index year	N (%)	15 (24.2)	12 (20.0)	0.577
Emergency clinic attendance in index year	N (%)	11 (22.4)	13 (21.3)	0.886
Received ECT in index year	N (%)	0 (0.0)	0 (0.0)	na
Ever violent	N (%)	26 (49.1)	16 (30.2)	0.047
Staff concern about violence	N (%)	10 (19.6)	5 (9.3)	0.130
Ever convicted of or charged with a criminal offence	N (%)	21 (33.9)	18 (30.5)	0.692
Ever in prison	N (%)	11 (17.7)	13 (21.7)	0.586
Never considered a suicide risk	N (%)	24 (53.3)	20 (40.8)	0.224
Ever admitted under Mental Health Act	N (%)	33 (67.3)	27 (51.9)	0.115
Global Assessment of Functioning	mean (median) [mean rank]	56.3 (55) [46.1]	63.8 (65) [61.8]	0.008

na = not applicable due to zero occurrences in each sector

Tests for significant differences in proportions performed using Chi-square tests with Pearson's statistic except for cases indicated by [1] where Fisher's exact test was used. Tests for significant differences in continuous variables performed using Mann Whitney tests.

4.3 Summary

The clients who were interviewed were acceptably representative of all those identified in the prevalence cohort. Some characteristics did differ between the two sectors and this was so for the identified sample as well as the smaller sub-sample who were interviewed at both times and who stayed in their respective sector. The intensive sector clients were less well functioning than those in the standard sector, when all identified clients were examined, and the difference was increased for the twice interviewed sample of 'stayers' because in the standard sector functioning was higher in this group than in the other standard sector clients.

4.4 Other findings of PRiSM Psychosis Study

The main findings of the *PRiSM Psychosis Study* that are not dealt with in any detail in this thesis (accept to some extent in Section 7) were:

- There were 28 natural and 11 unnatural deaths amongst 514 people identified with psychosis at the start of the study. Rates of violence, homelessness and imprisonment were relatively low. Over 40% of people were admitted overall and one fifth of people were admitted under the Mental Health Act. The two sectors did not differ significantly in terms of 'adverse events' (Johnson et al, 1998).

- The two types of care did not differ in their effect on symptoms and the standard sector clients had reduced disability when the initial level was medium or low (Wykes et al, 1998).

- There were no differences in demands or distress upon carers between the two sectors (Szmukler et al, 1998).

- Social network size was significantly lower in the intensive sector than the standard sector at baseline, but by follow-up it had risen and the difference became non-significant (Becker et al, 1998b).

- Met needs were more common in the intensive sector but there was no difference between sectors in terms of unmet needs or satisfaction with services (Leese et al, 1998).
- Quality of life did not change substantially over time, nor were there significant differences between the sectors (Taylor et al, 1998).

5. SERVICE USE AND COSTS

Services were measured, costed, and used according to the methodology described by Knapp and Beecham (1990), which is based on four rules. First, it is important to take a comprehensive approach to measuring and costing care. All relevant services which could be effected by an intervention should be included. In community care a large variety of services are provided by a number of different agencies, and a change in the way in which one aspect of care is provided has a potential impact on others. For example, a move from hospital to community based mental health care could feasibly effect the uptake and cost of care provided by social services or informal carers. Consequently an inclusive stance is required whereby all relevant services are measured and costed. In this study, general health care, forensic, employment, education, social, voluntary, and informal care services have been measured and costed in addition to core mental health care services i.e. in-patient care, NHS day centre attendances, psychiatrist contacts, visits from and to community psychiatric nurses, and contacts with psychologists and occupational therapists. Failure to be comprehensive in service measurement and costing is common (McCrone and Weich, 1996). This may lead to problems in the interpretation of findings - one intervention might be shown to be more or less expensive than another when in reality the overall cost difference could be in the opposite direction if all relevant services were included. However, it is also the case that in some circumstances it may be possible to focus on a limited range of services which are known to be particularly influential (Knapp and Beecham, 1993).

It can be argued that comprehensive costing as described above is the economic 'ideal'. However, other approaches may still be valid under specific circumstances. Wolff et al (1997) describe three different perspectives: that of the manager, the accountant and the economist. The management perspective focuses on the service use and costs which are directly relevant to the specific agency. For example, an NHS manager may be especially interested in the comparative costs of in-patient and day-hospital care, but may be less concerned with any associated costs that fall on local authorities or informal carers. The accounting perspective is defined as one where services are included for which an identifiable financial transfer occurs. In the above example this would include

the costs borne by the local authority but not the time costs of informal carers. With the economic perspective the aim is to measure all the resources that are involved in a service even if (as in the case of informal care or patient time) no payment is made. Economists tend to favour the latter option (Byford and Raftery, 1998; Drummond et al, 1997; Luce et al, 1996). However, given the complexities involved in costing non-remunerated services, the accountancy perspective is often adopted albeit with an emphasis on opportunity costing (see below).

One of the main aims of this study is to compare the costs of community mental health care in two distinct catchment areas. In order for this comparison to be valid it is necessary to recognise that community mental health care consists of a broad range of services provided by a number of agencies, and some services do not receive remuneration. Another key aim is to identify those service costs that have an influential impact on outcome. These aims suggest that the broad economic perspective is most appropriate and it is adopted (although not fully realised) in this study.

Second, cost variations should be explored. Although presenting average and total cost figures associated with the different modes of service delivery is informative it does conceal useful information regarding client differences. Service use and costs are likely to vary substantially between people using services. Factors that explain why these variations occur can be revealed via multiple regression analyses in the form of a 'cost-prediction equation'. By identifying significant explanatory factors of variation such a cost function may enable future costs to be predicted and as such can be a useful aid to resource allocation. A cost-prediction equation has been constructed for this study and is described in Section 6.

Third, it is important that like-with-like comparisons are adhered to. Randomised controlled trials (RCTs) are often championed as the 'gold standard' of evaluation. Their attractiveness is due to the 'cancelling out' of exogenous patient differences. However, RCTs are not always possible, or indeed appropriate. In this particular study, models of service provision are being compared between geographical areas and over time. With this in mind it was important that the two areas were matched in terms of social deprivation, and demographic characteristics so that comparisons could be made.

However, because some client differences are likely to exist in the absence of an RCT it was necessary to employ multiple regression techniques in order to standardise between the two groups. The cost-prediction equation function discussed in Section 6 is used to compare the standardised costs between samples.

Fourth, service use and costs should not be considered in isolation to outcomes. The least cost option is normally to do nothing, which is seldom desirable. If the aim is to maximise efficiency then either a maximum outcome from a given level of resource utilisation should be achieved, or for a given level of outcome resource costs should be as low as possible. One way of examining efficiency is thus to compare the ratio of cost to outcome for different service options, and this is described in Section 7. However, this approach has some problems and does not reveal which elements of a service package are influential in effecting outcome. It may be that other activities which a client undertakes have an effect on outcome as may the characteristics of the client. Section 8 of this thesis provides an analysis of how outcome is produced from a mixture of service inputs, other activities, and client characteristics.

5.1 Service use

The Client Service Receipt Interview (CSRI) was developed at the Personal Social Services Research Unit (University of Kent at Canterbury). Its main purpose has been to record the data necessary for the calculation of comprehensive care costs for people with mental health problems. The CSRI is typically 'tailor-made' for the specific study in which it is used. Such studies have included the evaluation of community based alternatives to hospitalisation (Knapp et al, 1990; Beecham et al, 1997), the Maudsley Daily Living Programme (Knapp et al, 1994; Knapp et al, 1998), a comparison of case-management focused CPN care with generic CPN care (McCrone et al, 1994), an evaluation of a community support worker service (Clarkson et al, 1999), an assessment of the cost-effectiveness of cognitive behavioural therapy (Kuipers et al, 1998), and a comparison of medication compliance therapy and non-specific counselling for people with psychosis (Healey et al, 1998). It has also been used with to calculate service costs

for young offenders, older people, children, leaning disabilities, stroke and chronic fatigue. The PRiSM version of the CSRI is included as an Appendix.

The CSRI is used pragmatically, utilising information from different sources where necessary. The PRiSM version of the CSRI was normally used in face-to-face interviews with clients, but on occasion information was given by carers when clients were not able to be interviewed directly. Information recorded in the CSRI related to the six months prior to the interview, and consisted of basic client characteristics, details of accommodation and household composition, employment status, receipt of welfare benefits and other income, general expenses, service use, and details of services which the client would liked to have received but did not. A period of six months was chosen over which to measure service utilisation as this allowed for a wide range of service contacts to be quantified by client self-report.

Clients were asked how often they had used specific services, if at all, during the previous six months and for how long on average. Information was supplemented and verified where possible by hospital records of in-patient episodes and out-patient attendances. Clients were also asked for details of other non-specified services. Therefore, for each client a record of six month service use was generated. The time and mode of travel by clients who used non-domiciliary services was also recorded.

The services measured were as follows:

(a) Core psychiatric services: in-patient episode, emergency clinic attendance, out-patient appointment, other contact with psychiatrist, day-hospital attendance, health funded day centre, psychologist, CPN (including case manager/key worker), occupational therapist and sheltered work.
(b) General health services: general hospital in-patient bed, out-patient appointment, day-patient-contact, accident and emergency department, physiotherapy, dentist, optician, chiropodist, smokers clinic, anxiety management, and family planning advice.
(c) General practitioner: surgery appointment and domiciliary visit.
(d) Accommodation: supported residential care and independent living.

(e) Legal services: police contacts (including overnight stays in police cells), court attendance, prison, probation officer, appointment with solicitor, and mental health review tribunal.

(f) Social worker: domiciliary visits and contacts at a service base.

(g) Social services: child protection officer, meals on wheels, and home help.

(h) Day centre (non-health provided): attendance at a day centre or 'drop-in' facility.

(i) Employment services: job centre and job club.

(j) Education services: adult education class.

(k) Informal care: time spent with clients by family or friends due to their mental health problem.

(l) Additional services: business training club, counsellor, social security officer, Member of Parliament, and welfare benefits advisor.

The distributions of the service use and cost data were frequently skewed and for each service there were many zero values. For continuous data, only non zero values (relating to people using the services) were analysed, and non-parametric analyses were undertaken. Differences over time were tested using the McNemar test for related dichotomous variables and Wilcoxon matched pairs signed-ranks test for related continuous variables. Differences between sectors were tested using the Chi-square test and Fisher's exact test for independent dichotomous variables and the Mann-Whitney U-Wilcoxon rank sum W test for independent continuous variables.

In the results which follow statistical significance is defined at the $p<0.1$ level, which is different from the significance level used in the sample description ($p<0.05$). There are three related reasons for choosing this higher p-value. The first reason concerns the level of risk that we are prepared to accept in interpreting a difference. Differences in the economic behaviour of individuals sometimes stem from differences in the degree to which they are 'risk averse'. Suppose two medical interventions exist for the same condition, one of which if it works could substantially improve health but if it fails could cause a sharp deterioration, whilst the other intervention could produce a similar level of improvement but also could leave an individual in their current state of health. Other things (such as original health state and cost of the interventions) being equal, a greater level of certainty (i.e. a lower p-value) about the effectiveness of the first

intervention would be required than for the second intervention. Similarly, different levels of risk aversivity can be applied to medical outcomes and cost outcomes. If we are more prepared to *mistakenly reject* the null hypothesis that costs are equal in the population from which the sample is drawn than we are to *mistakenly reject* the null hypothesis that outcomes are equal then this implies that we should choose a higher p-value for classifying a cost difference as statistically significant or not. Economists frequently stress the need to allocate scarce resources so as to maximise output. However, it is perhaps safe to assume that even with scarcity most individuals are more prepared to accept risk (i.e. higher p-values) when it comes to money. One example that can be observed is gambling which typically involves the potential loss or gain of money rather than health. (Some activities such as smoking can be seen as a health gamble, but it is unlikely that this is the primary purpose of those undertaking them). Another example is the Oregon experiment in health care prioritisation where decisions were ultimately based on the extent to which treatments could save lives rather than be 'cost-effective' (Hadorn, 1991).

The second reason for adopting a higher p-value for service use and cost data is that detecting significant differences is generally more difficult than for other data. Service use and cost data frequently show a marked skewness in their distributions as a result of a large number of people having zero or low service use, but with a small number accounting for disproportionately high service use. Gray et al (1997) show that to detect statistically significant differences in cost data, given such distributions, requires a sample size that is often substantially larger than that required to show statistically significant differences in clinical data. They point out that it may be ethically unacceptable to increase sample size just on the basis of the economic analysis. One option may be to accept 'p' values for cost differences that are greater than those for clinical data (O'Brien et al, 1994). Here, the distributional difficulties of the service use and cost data have been overcome to some extent by using non-parametric tests, but for some individual services there remain a low number of users which makes detection of significant differences problematic.

Finally, there is the general issue of sample size. In Section 4 (where $p<0.05$ was used) most comparisons were between a sub-sample of all identified clients and the remaining

identified clients. In the analyses presented in this section comparisons are made between sub-samples of *interviewed* clients. A reduced sample size implies that a 'true' difference will be harder to detect and therefore a large p-value may again be appropriate (Labovitz, 1970).

These three reasons have therefore led to the adoption of a p-value of 0.1. However, it is recognised there has been disagreement as to the appropriateness of using *any* pre-determined cut-off point in defining statistical significance (Kelly, 1994; Kanekar, 1990; Henkel and Morrison, 1970). It is, therefore, important to observe all differences in the data and to make a value judgement as to whether these are practically important in addition to assessing how statistically significant they are.

5.1.1 Service use for both sectors combined

During the six months prior to the baseline interview one quarter of the clients used in-patient care and one fifth lived in supported accommodation (Table 5.1). The mean length of stay was somewhat different to the median indicating that there were some particularly heavy users of in-patient care. In fact six clients spent more than 100 of the 182 days in the six month period as in-patients, with one of these being in a high secure hospital for the entire period. The majority of the sample saw psychiatrists and had GP contacts. In addition most also received other general health care services. It is clear that people who used day care services did so with a high level of frequency. A similar picture emerges at follow-up (Table 5.2), but with a lower proportion of in-patient users and a majority of people seeing CPNs. Two clients were in-patients for more than 100 days and the same client as before remained as a high secure patient.

5.1.2 Baseline and follow-up service use compared

Tables 5.1 and 5.2 do not allow straightforward comparisons to be made between baseline and follow-up due to the fact that some clients were only interviewed once. In Table 5.3 only information relating to those interviewed twice has been included so that valid comparisons can be made. Between baseline and follow-up significantly more clients received CPN care ($p=0.007$). There was also a significant structural change in the provision of day care away from the day hospitals ($p<0.001$), which were closing,

towards day centres (p=0.074). The proportion of clients using miscellaneous services also rose significantly (p=0.019).

Table 5.1. Percentage of clients using services at least once during the previous six months and the average number of contacts amongst users; all clients at baseline (n=203).

Service [1]	%	Mean	Median
Supported accommodation	19	na	na
Non-supported accommodation	80	na	na
In-patient care [2]	25	51	35
Emergency clinic	16	2	2
Day hospital	17	63	57
Day centre	25	42	24
Sheltered work	12	76	73
Psychiatrist	72	5	3
CPN	36	11	7
Psychologist	7	8	6
OT	6	6	5
GP	70	4	2
General health	65	9	2
Social worker	23	6	3
Social services	7	49	30
Legal	18	4	2
Employment	15	10	3
Education	10	25	16
Others	6	21	6
Informal care	22	68	38

[1] See pages 62-63 for definitions of service groups.

[2] Contact figures refer to bed days.

na = not applicable

Table 5.2. Percentage of clients using services at least once during the previous six months and the average number of contacts amongst users; all clients at follow-up (n=169).

Service [1]	%	Mean	Median
Supported accommodation	22	na	na
Non-supported accommodation	78	na	na
In-patient care [2]	17	41	32
Emergency clinic	9	2	1
Day hospital	2	50	43
Day centre	31	48	36
Sheltered work	12	71	76
Psychiatrist	70	5	3
CPN	53	18	12
Psychologist	7	8	3
OT	7	14	7
GP	63	3	2
General health	61	10	3
Social worker	17	4	2
Social services	15	56	28
Legal	22	2	2
Employment	11	24	5
Education	10	23	17
Others	11	27	3
Informal care	16	53	25

[1] See pages 62-63 for definitions of service groups.

[2] Contact figures refer to bed days.

na = not applicable

For the whole sample no other changes over time were statistically significant. With the exception of social services there was reasonable stability over time. Approximately one fifth of clients had been in-patients during both time periods, and sixteen were in-

patients both at baseline and follow-up. Most clients had been in contact with psychiatrists, GPs and general health care services at both baseline and follow-up.

The intensity of input for those clients using services is also detailed in Table 5.3. Intensity has here been defined as the number of service contacts during the six month cost period. The number of contacts with day care services was high as clients often attend regularly and frequently. The number of in-patient contacts was equated to the number of in-patient days, the assumption being that each day on an in-patient ward constituted a new contact. For the combined sample the increase in intensity of use of CPN care was the only statistically significant change ($p=0.011$).

5.1.3 Baseline and follow-up service use compared by sector (all patients in sample)

With all clients who were interviewed at baseline and follow-up considered (Table 5.4) it can be seen that in the intensive sector there was a fall in the number of people receiving in-patient care ($p=0.057$). Use of day centres increased significantly ($p<0.001$) mirroring the fall in the use of day hospital care ($p<0.001$). Use of CPNs ($p=0.064$) and social service care ($p=0.022$) increased significantly. In the standard sector there was also a decrease in the number of people using day hospital care ($p=0.039$) representing structural change, but there was no compensating increase in other forms of day care. Use of the emergency clinic fell ($p=0.039$), as did general health care ($p=0.078$) and informal care ($p=0.092$). Along with the intensive sector there was a significant increase in the use of CPN care ($p=0.078$).

In the intensive sector there was a significant increase in the intensity of use of CPN care ($p=0.008$) and in general health care ($p=0.035$). No intensity changes in the standard sector were significant, as expected for this more stable service. Table 5.4 does though show that average in-patient use amongst those admitted at both times decreased in both sectors.

5.1.4 Intensive and standard sector service use compared by time point (all patients in sample)

It can also be seen from Table 5.4 that at both baseline and follow-up there were a number of important differences between the two sectors. At baseline those in the

Table 5.3. Percentage of clients using services at least once during the previous six months and the average number of contacts amongst users; comparison between clients at baseline and follow-up (n=146)

Service [1]	Baseline			Follow-up		
	%	Mean	Median	%	Mean	Median
Supported accommodation	18	na	na	21	na	na
Non-supported accommodation	82	na	na	79	na	na
In-patient care [2]	23	54	39	19	43	32
Emergency clinic	16	2	2	10	1	1
Day hospital	18	63	57	2	57	60
Day centre	24	51	43	32	48	36
Sheltered work	12	72	75	13	72	84
Psychiatrist	71	5	3	71	5	3
CPN	37	10	7	50	19	12
Psychologist	8	7	6	5	10	5
OT	7	4	4	7	14	7
GP	67	4	2	66	3	2
General health	63	9	2	62	10	2
Social worker	23	6	3	19	4	2
Social services	8	67	28	14	79	35
Legal	16	4	2	21	2	2
Employment	14	5	3	12	24	4
Education	14	22	13	10	24	19
Others	3	3	1	11	5	2
Informal care	21	73	36	17	56	25

[1] See pages 62-63 definitions of service groups.

[2] Contact figures refer to bed days.

na = not applicable

intensive sector were significantly more likely to use supported accommodation (p=0.001), day hospital care (p=0.031), and in-patient care (p=0.050). Significantly more standard sector clients made use of non-supported accommodation (p=0.001), general health care (p=0.006), GPs (p=0.035), occupational therapists (p=0.049), and sheltered workshops (p<0.001). (The greater occupational therapist use in the standard sector may be misleading as some of the intensive sector clients probably used this service as part of their day hospital care).

At follow-up more intensive sector clients used day centres (p=0.001) and supported accommodation (p=0.001). Standard sector clients continued to make more use of non-supported accommodation (p=0.002) and sheltered workshops (0.027), and also psychiatrists (p=0.046) and the emergency clinic (p=0.092).

Intensity of service use did not differ greatly between the two sectors amongst those clients actually in receipt of services. At baseline, intensive sector clients using the day hospital did so more than those in the standard sector (p=0.066). At follow-up, there was a significantly higher level of intensity of use of sheltered work amongst the standard sector clients than the intensive sector ones (p=0.034).

5.1.5 Baseline and follow-up service use compared by sector ('staying' sample)

The above analyses examined time and sector differences for the sample of clients that were interviewed twice. However, a number of clients moved out of the area during the course of the study and it is important to take this into account when drawing conclusions about the efficiency of the two different models of care. If this does not happen the cost and outcome changes may be attributed to one of the two sectors when in fact they could be influenced by care received elsewhere.

Table 5.5 shows that in the intensive sector the number of people using CPN care increased (p=0.093) and the number who were in-patients decreased (0.092). These changes are not as significant as those observed for the larger sample of intensive sector clients, some of whom had moved away. There were similar degrees of change in the use of day hospital (p<0.001) and day centre (p<0.001) care. Use of social services care again increased but not significantly (p=0.109).

Table 5.4. Percentage of clients using services at least once during the previous six months and the average number of contacts amongst users; comparison between intensive sector and standard sector clients at baseline and follow-up (n=146).

Service [1]	Intensive sector (n=73)						Standard sector (n=73)					
	Baseline			Follow-up			Baseline			Follow-up		
	%	X	M	%	X	M	%	X	M	%	X	M
Supported accom.	29	na	na	33	na	na	7	na	na	10	na	na
Non-supported accom.	71	na	na	69	na	na	92	na	na	89	na	na
In-patient care [2]	30	54	33	19	40	32	16	54	49	18	46	32
Emergency clinic	15	2	1	14	1	1	16	3	2	6	1	1
Day hospital	25	76	65	3	80	80	11	37	38	1	12	-
Day centre	22	68	62	45	53	44	26	38	25	19	37	25
Sheltered work	3	79	79	7	35	22	22	71	75	19	85	100
Psychiatrist	70	6	4	63	6	3	73	4	3	78	4	3
CPN	33	13	12	47	30	12	41	9	7	53	10	12
Psychologist	4	4	4	3	19	19	11	9	6	7	7	2
OT	3	4	4	10	11	6	11	4	4	4	23	25
GP	59	4	2	63	3	2	75	3	2	69	4	2
General health	52	10	2	62	11	3	74	9	2	62	8	2
Social worker	21	5	2	23	3	1 .	25	7	3	15	5	2
Social services	6	34	33	18	59	37	11	84	26	10	115	32
Legal	14	6	3	19	2	2	19	2	2	23	2	2
Employment	10	3	3	11	5	4	18	6	3	12	42	9
Education	7	25	15	7	21	17	11	20	13	14	25	21
Informal care	16	43	36	18	35	14	26	90	36	16	77	64

[1] See pages 62-63 for definitions of service groups.

[2] Contact figures refer to bed days.

na = not applicable

X = mean, M = median

As before significant changes were observed for the standard sector, with day hospital use falling (0.031), as did the use of general health care services (p=0.064) and the emergency clinic (p=0.039). For this sample there was no significant change in the number of people receiving CPN or informal care.

As with the sample of all clients interviewed at baseline and follow-up, a significantly higher proportion of intensive sector clients who stayed used supported accommodation at both baseline and follow-up ($p<0.001$). The difference is more significant though due to the fact that standard sector clients living in supported accommodation elsewhere are not now included.

There was a significant increase in the intensity of use of CPN services ($p=0.028$) and general health care ($p=0.044$) amongst the intensive sector clients, as was found for the larger sample. Unlike before, the intensity of GP use fell significantly in this sector ($p=0.064$). For the standard sector there was an increase in the intensity of use of sheltered work ($p=0.091$) but a decrease in the use of psychiatrist services ($p=0.034$).

At baseline the standard sector had a significantly higher proportion of clients using general health care services ($p=0.030$) and sheltered work ($p=0.004$), whilst the intensive sector clients made more use of in-patient ($p=0.036$) and day hospital care ($p=0.012$). Although a greater proportion of standard sector clients used GP and occupational therapy services than those in the intensive sector, the difference was not significant.

5.1.6 Intensive and standard sector service use compared by time point ('staying' sample)

At follow-up the intensive sector clients used day centres more ($p=0.001$). A significantly higher proportion than in the standard sector used occupational therapy care ($p=0.030$) and social workers ($p=0.042$). The standard sector clients had significantly more contact with psychiatrists ($p=0.082$) and sheltered work ($p=0.062$). There was now no significant difference between the sectors in the proportion of clients attending the emergency clinic.

For intensity of service use there was only one statistically significant difference between the sectors: at follow-up the use of sheltered work was greater for the standard sector clients who used this service than the intensive sector clients ($p=0.015$).

Table 5.5. Percentage of clients using services at least once during the previous six months and the average number of contacts amongst users; comparison between intensive sector and standard sector who stayed within sectors at baseline and follow-up (n=123).

Service [1]	Intensive sector (n=62)						Standard sector (n=61)					
	Baseline			Follow-up			Baseline			Follow-up		
	%	X	M	%	X	M	%	X	M	%	X	M
Supported accom.	31	na	na	32	na	na	2	na	na	3	na	na
Non-supported accom.	69	na	na	69	na	na	97	na	na	95	na	na
In-patient care [2]	31	49	31	19	42	36	15	54	41	18	40	25
Emergency clinic	16	2	1	13	1	1	16	2	2	5	1	1
Day hospital	27	73	63	3	93	93	10	45	51	0	0	-
Day centre	21	72	75	45	54	47	21	37	41	18	35	25
Sheltered work	3	79	79	8	35	22	20	79	75	20	91	100
Psychiatrist	73	6	4	65	6	3	71	5	3	79	3	3
CPN	31	15	16	45	32	13	41	8	6	51	8	6
Psychologist	5	4	4	2	12	-	10	6	6	3	4	4
OT	3	4	4	11	11	6	12	3	2	2	20	na
GP	58	5	3	60	3	2	72	3	2	69	3	2
General health	53	3	2	63	12	3	72	3	2	57	4	2
Social worker	23	6	2	26	3	1	21	5	3	12	6	2
Social services	7	34	33	18	44	25	10	108	104	8	160	182
Legal	13	7	4	19	2	2	18	3	1	20	2	1
Employment	10	4	3	10	5	4	20	6	3	12	53	12
Education	7	23	14	8	21	17	10	26	14	10	13	16
Informal care	15	37	28	16	35	10	20	94	42	12	74	78

[1] See pages 62-63 for definitions of service groups.

[2] Contact figures refer to bed days.

na = not applicable

X = mean, M = median

A summary of the main service use findings is as follows:

- The intensive sector clients made more use of in-patient care at baseline than the standard sector clients. By follow-up the proportions using in-patient care were similar.
- There was a difference between the two sectors in the use of supported accommodation at baseline and follow-up, with a greater supply in the intensive sector possibly leading to higher utilisation.
- A structural change in day care occurred in both sectors. Day hospital use fell and in the intensive sector day centres took its place. The standard sector saw no such compensating change but did maintain its high use of sheltered work.
- In both sectors the use of CPNs increased substantially over time.

5.2 Service costs

Economic evaluation is concerned with how scarce resources are allocated. Resources can generally be used in alternative ways and, because of scarcity, opportunities may be forgone by using resources in one way rather than another. It is the value of the forgone opportunity that determines the cost of the activity that the resources are actually used for. This is the concept of 'opportunity cost' and is in theory the guiding principal behind evaluation from the economic perspective (Wolff et al, 1997). Opportunity costs reflect the value related to the decision that has been made to allocate resources in a specific way, and economic evaluation aims to identify the outcome that is achieved by making such a decision. It should be apparent that a resource can have an opportunity cost irrespective of the payment made for its use. For instance, informal care and patient time can be used in alternative ways but they do not receive remuneration. Also, some professionals may be paid more than they would demand for doing their job whereas others would demand more but still work for non-pecuniary reasons. These are examples of market imperfections which result in a divergence between financial costs and opportunity costs. If we are interested in linking the value of resources to the outcomes that can be achieved through them then opportunity costs are appropriate.

However, policy makers are typically faced with decision making in the context of a fixed financial budget, and are consequently more likely to be interested in financial costs than opportunity costs. Opportunity costs are also problematic to calculate for two reasons. Firstly, it would be necessary to identify the activity that is being forgone (this may be different within professions as well as between them). Secondly, an appropriate way of valuing these forgone activities is required. As a result of these difficulties it is conventional to use the financial costs of services in evaluations, but to recognise that these may be a deviation from the 'true' opportunity costs. Use of financial costs is a second best alternative but one which may be particularly acceptable to policy makers.

Economists also stress the need to focus on marginal rather than average costs. Marginal costs are important because we are interested in the 'extra' cost associated with a change in activity. What, for example, are the implications of caring for ten extra patients with schizophrenia? In the short-run there is unlikely to be any change in infrastructure or staffing (fixed costs), and therefore simply multiplying the existing *average cost* by ten will not indicate the real cost change. The theoretical ideal of marginal costing, like that of opportunity costing, is not straightforward to apply in practice, one reason being that financial information tends to consist only of total and average costs (Knapp, 1993). However, over time one would expect real changes in activity to lead to changes in all costs - fixed and variable. Revenue costs in the short run, with the addition of capital costs and other overheads, should be similar to long-run marginal costs (Knapp, 1993). There is no simple definition of short-run and long-run, but the *PRiSM Psychosis Study* examined changes in resource use over an average period of 2.5 years which is probably long enough for changes in utilisation to feed through to changes in capacity.

To calculate the overall cost of a particular service the total service contact time (number of contacts multiplied by the average duration of contact) was multiplied by the unit cost for that service. The unit costs for generic services were calculated from salaries, employer additions, travel expenses, and overheads. Many of these had been previously calculated as national unit costs (Netten, 1994). The prices of localised services, such as hospital services and day centres, were calculated with reference to the capital value of the service base and the level of expenditure, with information being extracted from annual accounts where available. Unit costs were derived from data for

different years (mainly 1993/94) and inflated to 1995/6 prices using a health or social services price multiplier. It is not thought that structural changes in the working practices of staff would have been sufficiently large to render these inflated costs inappropriate.

Accommodation and daily living activities are key components of community care. Accommodation costs are made up of a capital element and the level of daily living expenditure, for example on food. For supported accommodation this information was obtained from the annual accounts of the specific facility. Just as the cost of supported accommodation has been measured, so has the cost of mainstream accommodation. Supported accommodation consists of 'hotel items' (heating, food etc) in addition to 'therapeutic inputs.' Non-supported accommodation also contains comparable hotel items. To compare like with like it is important that we observe the extra cost of supported accommodation either by including non-supported accommodation (as here) or by calculating the net costs (total supported accommodation cost minus hotel costs). The costs of non-supported accommodation were calculated by adding the cost of everyday living, obtained from the Family Expenditure Survey (Central Statistical Office, 1992) to the capital value of the property, divided by the number of people in the household. Capital values for both supported and non-supported accommodation were calculated by *annuitising* the current market value over a period of 60 years at an interest rate of 6% (Allen and Beecham, 1993). This allows the opportunity cost of accommodation to be arrived at because it enables us to base the accommodation value on the equivalent resources invested so as to earn interest.

Relatives and friends of the people in this study were often providers of care. Such informal carers are not paid and, therefore, this constitutes a hidden cost. A number of options are available by which such costs can be measured. First, we could refrain from attaching any monetary value to informal care. This would, however, only be appropriate if we were to adopt a particularly narrow perspective to costing, i.e. one where only costs borne to formal services, and which incur observable expenditure, are considered relevant. From an economic viewpoint this would not be suitable because it ignores the likelihood that the informal carer could be using their time in an alternative way (resulting in an opportunity cost) and that informal care may act as a substitute for

statutory services. A second option would be to assume that the informal carer is giving up employment in order to perform this role. If a perfectly functioning labour market is also assumed then the wage forgone reflects the lost productivity and, therefore, the opportunity cost of informal care. If leisure time is forgone then some fraction of the wage rate could be used, or alternatively the wage rate plus an element for overtime as this is what may be needed for an employer to buy such time off an individual (Drummond et al, 1997). However, labour markets seldom function perfectly and wages may not reflect productivity. In addition, the existence of unemployment means that people leaving the labour market can sometimes be replaced after a short period (Koopmanschap and van Ineveld, 1992), and therefore the social cost of informal care under this option could be much less than the private cost (which would still be indicated by the forgone wage). Difficulties with this option are compounded when informal carers are retired or absent from the labour market for other reasons. The final option considered here is the *replacement cost approach*. This assumes that the opportunity cost of informal care is equal to the cost of replacing the informal carer with someone else who is formally employed to perform the same role. Alternatively we could assume that the informal carer could themselves perform this role for someone else and receive payment for it. This third option was deemed appropriate for this study. A number of informal carers were retired and therefore absent from the labour market, and the area of London in which the study took place had relatively high levels of unemployment which means that forgone earnings would not reflect lost production. It was assumed that the informal care provided could potentially be traded in the employment market as a home help service. The unit cost of the latter was therefore used to approximate informal care costs. It is possible though that some of these activities would have been performed even in the absence of a mental health problem. If this is the case then we would need to separate out the extra informal care cost that is due to the illness. This is far from straightforward as not all carers know how much time spent is illness related especially if they have performed the caregiving role for some years. Therefore all informal care costs are included but it is recognised that these might in some cases be an overestimate.

Another hidden cost relates to the value of time spent by the client travelling to use, and actually using, a service. This is likely to be substantial. However, there has been little

work done on calculating the value of forgone non-employment time - only 13.5% of the sample originally identified were in full or part time employment - and these costs have not been estimated.

5.2.1 Service costs for both sectors combined

The six month service costs for the whole sample at baseline are detailed in Table 5.6. As with the previous service use figures the average costs relate only to those clients actually using the service. In-patient care is on average the most expensive service followed by supported accommodation. Day care is an expensive service due to the high level of receipt amongst those using it. GP care is shown to be relatively inexpensive. Non-supported accommodation accounts for the largest proportion of total cost, and in-patient costs make up just over one fifth of the total. The total six month cost of formal services (i.e. excluding non-supported accommodation and informal care) was nearly three quarters of a million pounds. The mean cost of formal services (£3537) was substantially greater than the median cost (£1533), indicating that there was a high level of skewness in the cost distribution. The range of formal service costs was between £16 and £34,212. The mean and median total costs (including informal care and non-supported accommodation) were more similar, and the range was between £1859 and £34,212.

By follow-up (Table 5.7) the average cost of in-patient care had fallen as had the amount that it contributed to the total. The latter was caused in large part by the decrease in the number of people using in-patient care in the intensive sector. There was a fall in total formal service costs to just over half a million pounds. The large difference between the mean (£3076) and the median (£1612) service cost was again observed. Formal service costs ranged from £0 to £34692, and total costs from £1643 to £34,692.

5.2.2 Baseline and follow-up service costs compared

As before the changes over time can only adequately be compared by looking at the sample of clients who were interviewed at both baseline and follow-up. The average service costs shown in Table 5.8 do not indicate much change over time. The increase in non-supported accommodation costs was though significant (p=0.003). Only those cases where a positive cost occurs at baseline and follow-up have been included, which

obviously limits the power of the tests to detect significant change. It is though interesting to observe changes that did occur even if they are not statistically significant, for instance the average cost of in-patient care fell substantially (p=0.125).

Table 5.6. Average service costs amongst users for previous six months, aggregate costs and percentage contribution to total (1995/96 £s); all clients at baseline (n=203).

Service [1]	Mean	Median	Aggregate	% contr.
Supported accommodation	4759	4852	185,596	13.5
Non-supported accommodation	3385	3220	551,797	40.2
In-patient care	5793	3484	295,432	21.5
Emergency clinic	97	65	3104	0.2
Day hospital	1397	1033	43,799	3.2
Day centre	543	254	26,300	1.9
Sheltered work	1607	1433	38,182	2.8
Psychiatrist	187	129	30,351	2.2
CPN	340	208	26,380	1.9
Psychologist	501	309	8269	0.6
OT	220	148	2709	0.2
GP	43	25	7096	0.5
General health	189	49	28,358	2.1
Social worker	63	20	3490	0.3
Social services	487	467	7437	0.5
Legal	251	36	6336	0.5
Employment	65	6	1959	0.1
Education	99	61	2253	0.2
Others	88	51	975	0.1
Informal care	2101	847	103,781	7.6
All formal services	3537	1533	718,027	59.8
All costs	6667	5562	1,373,605	100.0

[1] See pages 62-63 for definitions of service groups.

Table 5.7. Average service costs amongst users for previous six months, aggregate costs and percentage contribution to total (1995/96 £s); all clients at follow-up (n=169).

Service [1]	Mean	Median	Aggregate	% contr.
Supported accommodation	4558	3856	168,634	15.8
Non-supported accommodation	3737	3527	493,268	46.3
In-patient care	4429	2485	128,185	12.0
Emergency clinic	69	43	1035	0.1
Day hospital	1994	1994	4899	0.5
Day centre	624	337	32,714	3.1
Sheltered work	1201	1163	26,691	2.5
Psychiatrist	198	129	22,678	2.1
CPN	527	188	40,398	3.8
Psychologist	521	164	6634	0.6
OT	695	534	7646	0.7
GP	35	24	4232	0.4
General health	351	49	33,330	3.1
Social worker	41	21	1701	0.2
Social services	1306	261	28,001	2.6
Legal	125	28	5652	0.5
Employment	177	9	2890	0.3
Education	175	99	2569	0.2
Others	108	21	2014	0.2
Informal care	2115	727	52,936	5.0
All formal services	3076	1612	519,904	48.8
All costs	6308	5398	1,066,108	100.0

[1] See pages 62-63 for definitions of service groups.

The combined costs of in-patient and supported accommodation care came to 34.4% of the baseline total, and 28.6% of the follow-up figure. The mean formal service cost fell by £290 (around 8%) over time, which was not statistically significant. The mean total cost fell by £260 (4%). However, it can be seen that the median costs for both measures rose over time.

5.2.3 Baseline and follow-up service costs compared by sector (all patients in sample)

Between baseline and follow-up (Table 5.9) the cost of CPN care in the intensive sector increased significantly (p=0.091). In the standard sector there was a significant decrease in the cost of in-patient care (p=0.068). Non-supported accommodation costs were significantly higher at follow-up both for the intensive (p=0.013) and the standard (p=0.056) sectors. No other differences were significant.

The increase in the cost of non-supported accommodation is of interest. The unit costs for different types of housing were not increased in line with inflation. Therefore this rise reflects real changes in independent living costs for these clients.

In the intensive sector in-patient care and supported accommodation together accounted for 45.1% of total baseline costs. By follow-up this figure was 31.3%. The contribution made by CPN care doubled over the two periods. The combined cost of day care at baseline made up 9.9% of total cost and this fell to 6.7% at follow-up. Informal care costs contributed 2.4 times as much to total cost at follow-up than they did at baseline.

In the standard sector the residential services (in-patient and supported accommodation) were 23.5% of the total baseline cost. The figure at follow-up was slightly higher at 25.8%. There was a large rise in the total cost of supported accommodation over time, and there was a one percentage point decrease in the contribution made by day care services over time. The total cost of informal care fell substantially by the follow-up period.

The intensive sector saw mean service costs fall from £4400 to £3767 - a reduction of 14%. In the standard sector there was a mean cost increase of £90 (3%). Total costs fell in both sectors. These changes were not significant.

Table 5.8. Average service costs amongst users for previous six months, aggregate costs and percentage contribution to total (1995/96 £s); comparison between clients at baseline and follow-up (n=146).

Service [1]	Baseline				Follow-up			
	Mean	Med.	Agg.	%	Mean	Med.	Agg.	%
Supported accom.	4392	3992	114,196	11.6	4712	4850	146,062	15.4
Non-supported accom.	3353	3186	399,039	40.5	3692	3534	424,608	44.8
In-patient care	6622	3668	225,143	22.8	4641	2485	125,058	13.2
Emergency clinic	9474	86	2156	0.2	55	43	776	0.1
Day hospital	1530	971	34,902	3.5	1994	1994	4290	0.5
Day centre	639	339	21,463	2.2	677	357	31,066	3.3
Sheltered work	1561	1358	27,160	2.8	1233	1234	24,790	2.6
Psychiatrist	199	129	22,831	2.3	207	129	20,751	2.2
CPN	362	208	20,107	2.0	542	201	33,480	3.5
Psychologist	459	309	6392	0.6	694	391	4859	0.5
OT	139	63	1280	0.1	761	578	7613	0.8
GP	40	23	4462	0.5	36	24	3785	0.4
General health	175	49	19,854	2.0	350	49	30,456	3.2
Social worker	63	20	1632	0.2	41	21	1632	0.2
Social services	487	467	5611	0.6	1306	261	25,100	2.6
Legal	159	36	3858	0.4	129	27	5106	0.5
Employment	11	6	210	*	188	8	2879	0.3
Education	106	44	1330	0.1	187	100	2528	0.3
Others	48	47	250	*	59	13	1157	0.1
Informal care	1968	722	72,865	7.4	2248	727	51,631	5.4
All formal services	3519	1494	513,761	52.1	3229	1641	471,390	49.7
All costs	6751	5331	985,665	100	6491	5396	947,630	100

[1] See pages 62-63 for definitions of service groups.

non-zero value less than 0.1

Med. = median

Agg. = aggregate

5.2.4 Intensive and standard sector service cost compared by time point (all patients in sample)

At baseline the intensive sector had higher day centre costs (p=0.006) and legal service costs (p=0.072) than the standard sector. Social worker costs were more expensive in

the standard sector (p=0.093) as were supported accommodation costs (p=0.028). However, supported accommodation was in total far more expensive in the intensive sector than in the standard sector, due to differences in supply. The contribution made by in-patient care to total costs was ten percentage points higher for the intensive sector than the standard sector at baseline. Non-parametric tests showed that formal service costs were significantly higher in the intensive sector than in the standard one but only marginally (p=0.094). The difference for total costs was not significant.

At follow-up the intensive sector had significantly higher CPN costs (p=0.006), whilst the standard sector had higher sheltered work costs (p=0.030). Supported accommodation was still more expensive amongst the standard sector clients (p=0.002). The contribution made to total costs by in-patient care was greater in the standard sector than in the intensive sector, in contrast to the baseline situation. The mean service cost difference had narrowed by follow-up but the intensive sector remained significantly more costly (p=0.025).

5.2.5 Baseline and follow-up service costs compared by sector ('staying' sample)

As with the sample of all clients interviewed twice, the reduced sample of those who remained within sector had higher non-supported accommodation costs at follow-up when compared to baseline (Table 5.10). This was the case for the intensive (p=0.023) and the standard sector (p=0.090). In the latter psychiatrist costs were significantly lower at follow-up (p=0.046).

In the intensive sector the mean follow-up service costs were £394 lower than those at baseline, representing a fall of 9%. This is a smaller decrease than for the larger sample. In contrast to the previous finding, the mean standard care costs fell over time. However, the changes for neither sector were statistically significant.

Table 5.9. Average service costs amongst users for previous six months, aggregate costs and percentage contribution to total (1995/96 £s); comparison between intensive sector and standard sector clients at baseline and follow-up (n=146).

	Intensive sector (n=73)								Standard sector (n=73)							
	Baseline				Follow-up				Baseline				Follow-up			
Service [1]	Mean	Med.	Agg.	%	Mean	Med.	Agg.	%	Mean	Med.	Agg.	%	Mean	Med.	Agg.	%
Supported accom.	4131	3856	86,750	17.4	4101	3531	98,428	20.3	5489	5363	27,446	5.6	6805	5693	47,634	10.3
Non-supported accom.	3143	3017	163,449	32.8	3520	3201	176,019	36.4	3516	3344	235,590	48.4	3824	3584	248,590	53.6
In-patient care	6283	3528	138,233	27.7	3805	2534	53,012	11.0	7243	4742	86,910	17.9	5542	2039	72,046	15.5
Emergency clinic	74	43	819	0.2	56	43	560	0.1	111	86	1336	0.3	54	43	216	*
Day hospital	1905	1033	28,020	5.6	1994	1994	3987	0.8	942	861	6883	1.4	na	na	302	0.1
Day centre	1123	890	16,231	3.3	780	381	25,019	5.2	298	195	5232	1.1	436	337	6047	1.3
Sheltered work	3944	-	5013	1.0	419	272	3259	0.7	1391	1339	22,147	4.5	1504	1662	21,530	4.6
Psychiatrist	214	172	12,891	2.6	272	129	12,537	2.6	188	129	9940	2.0	154	129	8215	1.8
CPN	585	294	12,743	2.6	916	476	24,861	5.1	247	208	7365	1.5	241	169	8619	1.9
Psychologist	118	118	467	0.1	1427	1427	2855	0.6	556	309	5925	1.2	401	96	2004	0.4
OT	63	-	148	*	596	178	4174	0.9	152	140	1133	0.2	1146	889	3439	0.7
GP	28	21	1830	0.4	36	24	1832	0.4	48	32	2632	0.5	31	21	1953	0.4
General health	205	61	11,611	2.3	457	49	25,472	5.3	157	43	8242	1.7	123	61	4983	1.1
Social worker	42	10	719	0.1	46	22	614	0.1	79	38	1837	0.4	28	21	1018	0.2
Social services	343	309	1835	0.4	1070	191	16,543	3.4	560	589	3776	0.8	1683	334	8557	1.8

Table 5.9. (continued)

Service [1]	Intensive sector (n=73)								Standard sector (n=73)							
	Baseline				Follow-up				Baseline				Follow-up			
	Mean	Med.	Agg.	%	Mean	Med.	Agg.	%	Mean	Med.	Agg.	%	Mean	Med.	Agg.	%
Legal	428	73	3339	0.7	43	28	545	0.1	35	29	519	0.1	187	27	4561	1.0
Employment	7	6	50	*	10	7	111	*	12	6	160	*	308	19	2768	0.6
Education	84	38	416	0.1	83	87	487	0.1	114	52	914	0.2	238	100	2041	0.4
Others	43	43	85	*	56	21	658	0.1	51	64	164	*	61	11	499	0.1
Informal care	1220	710	14,124	2.8	2967	729	33,095	6.8	2482	847	58,741	12.1	1528	725	18,536	4.0
All formal services	4400	2161	321,200	64.4	3767	2720	274,955	56.8	2638	960	192,561	39.5	2728	1124	196,435	42.4
All costs	6833	5030	498774	100.0	6631	5429	484,069	100.0	6670	5333	486,891	100.0	6350	5271	463,560	100.0

[1] See pages 62-63 for definitions of service groups. * non-zero value less than 0.1

Med. = median

Agg. = aggregate

5.2.6 Intensive and standard sector service cost compared by time point ('staying' sample)

At baseline the intensive sector again had higher costs than the standard sector for day centres (p=0.009) and legal services (p=0.054), with the standard sector having more costly social worker care (p=0.093). The intensive sector mean formal service costs were £2146 greater than those in the standard sector. Using non-parametric tests it was found that the intensive sector was significantly more costly (p=0.008).

By follow-up the intensive sector still had higher CPN costs (p=0.003) and the standard sector had greater sheltered work costs (p=0.010). The difference in mean formal service costs was now £1837 (p=0.003).

In summarising the cost findings it is helpful to observe them graphically. Figure 5.1 reveals the extent of the changes in aggregate costs over time for the whole sample. For eleven of the twenty services (or service groups) the follow-up costs were increased. It can be seen that the costs of employment services, social services, occupational therapy and miscellaneous services increased substantially. In-patient, day hospital, emergency clinic, informal care and psychologist costs at follow-up were greatly reduced compared to the baseline figures.

For clients who stayed in the intensive sector, changes over time (Figure 5.2) show large cost increases for occupational therapists, social services and miscellaneous services. Twelve of the 20 services saw a cost increase, and for five follow-up costs were more than 200% of the baseline figure. Formal services at follow-up were 87% of their baseline figure. In-patient care at follow-up was 46% of the baseline total.

Overall costs for the standard sector stayers rose for half the services measured (Figure 5.3). The major increases were for employment, legal and miscellaneous services. Large decreases were seen for day hospital care, the emergency clinic, psychologists and informal care.

Table 5.10. Average service costs amongst users for previous six months, aggregate costs and percentage contribution to total (1995/96 £s); comparison between intensive sector and standard sector clients who stayed within sectors at baseline and follow-up (n=123).

Service [1]	Intensive sector (n=62)								Standard sector (n=61)							
	Baseline				Follow-up				Baseline				Follow-up			
	Mean	Med.	Agg.	%	Mean	Med.	Agg.	%	Mean	Med.	Agg.	%	Mean	Med.	Agg.	%
Supported accom.	3895	3856	74,008	18.0	3875	3527	77,508	19.4	6384	na	6384	1.7	7489	7489	14,978	4.2
Non-supported accom.	3083	3018	132,558	32.2	3454	3192	148,522	37.2	3523	3377	207,834	56.1	3758	3580	217,941	61.2
In-patient care	5583	3453	106,085	25.8	4079	3169	48,688	12.2	7045	3484	63,407	17.1	4833	1887	53,157	14.9
Emergency clinic	69	43	690	0.2	59	43	474	0.1	86	86	862	0.2	57	43	172	*
Day hospital	1472	971	24,645	6.0	1994	1994	3987	1.0	1138	1439	5982	1.6	na	na	0	0
Day centre	1208	910	14,597	3.6	766	381	21,440	5.4	259	225	3191	0.9	388	339	4310	1.2
Sheltered work	3944	-	5013	1.2	419	272	3259	0.8	1625	1509	18,929	5.1	1641	1886	19,787	5.6
Psychiatrist	222	172	12,176	3.0	291	129	11,783	3.0	200	129	8532	2.3	145	129	6534	1.8
CPN	726	819	11,966	2.9	980	560	22,103	5.5	233	208	5784	1.6	200	105	5943	1.7
Psychologist	118	118	467	0.1	926	na	926	0.2	623	389	3740	1.0	235	235	470	0.1
OT	63	-	148	*	596	178	4174	1.0	75	23	588	0.2	889	na	889	0.2
GP	27	19	1631	0.4	36	24	1340	0.3	42	31	1885	0.5	19	19	1166	0.3
General health	211	60	10,853	2.6	505	44	22,937	5.8	154	38	3450	0.9	85	49	2634	0.7
Social worker	42	10	708	0.2	46	22	592	0.1	79	38	976	0.3	28	21	728	0.2
Social services	343	309	1835	0.4	1070	191	11,489	2.9	570	620	3357	0.9	1764	450	8414	2.4

Table 5.10. (continued)

Service [1]	Intensive sector (n=62)								Standard sector (n=61)							
	Baseline				Follow-up				Baseline				Follow-up			
	Mean	Med.	Agg.	%	Mean	Med.	Agg.	%	Mean	Med.	Agg.	%	Mean	Med.	Agg.	%
Legal	370	73	2250	0.5	40	19	411	0.1	34	23	408	0.1	207	23	2144	0.6
Employment	7	5	44	*	11	7	96	*	13	6	156	*	395	25	2762	0.8
Education	84	38	298	0.1	83	87	487	0.1	145	107	872	0.2	105	95	555	0.2
Others	43	43	85	*	56	21	658	0.2	10	na	74	*	14	10	492	0.1
Informal care	1296	843	11,071	2.7	2192	645	17,994	4.5	1682	722	34,160	9.2	1856	2179	12,862	3.6
All formal services	4406	2445	267,497	65.1	4012	2802	232,352	58.3	2260	996	128,576	34.7	2175	1108	125,137	35.2
All costs	6723	5262	411,126	100.0	6568	5456	398,867	100.0	6228	5185	370,570	100.0	5923	5103	355,940	100.0

[1] See pages 62-63 for definitions of service groups. * non-zero value less than 0.1

Med. = median

Agg. = aggregate

By comparing intensive sector and standard sector stayers at baseline (Figure 5.4) it can be seen that the latter had higher costs for eleven of the twenty services. This was particularly so for psychologists, occupational therapists, sheltered work, employment services, informal care and education services. The intensive sector had far higher costs for supported accommodation, day hospital and day centre care, CPNs, general health services and legal services. The total cost of formal services in the standard sector was 48% of that in the intensive sector.

At follow-up the intensive sector now had higher costs for 13 of the services (Figure 5.5). All the mental health staff costs were much higher, as were day centre and day hospital care, supported accommodation and general health services. The standard sector now had substantially higher legal service costs – a reverse of the baseline situation. Employment and sheltered work costs continued to be much greater in the standard sector.

5.3 Discussion of service use and cost findings

This section has presented comprehensive measures of service utilisation and cost for two representative samples of psychotic patients within epidemiologically defined geographical sectors. The methodology employed a 'bottom-up' approach where actual service use by the clients in the study was costed. Service use was generally measured by client self report. An argument can be made that the accuracy of such data is limited. However, the work that has been done on assessing client self report has found it be a reliable method of data collection (Calsyn et al, 1993).

A broad range of services are used by people with mental health problems, and these are often provided by non-mental health agencies. This identification of multi-agency provision adds weight to the importance of close working between such agencies. The need for a comprehensive approach to costing is emphasised by the fact that a large proportion of the cost burden falls to services which are not core psychiatric services. GPs, psychiatrists and general health care are used by a majority of clients. However, a

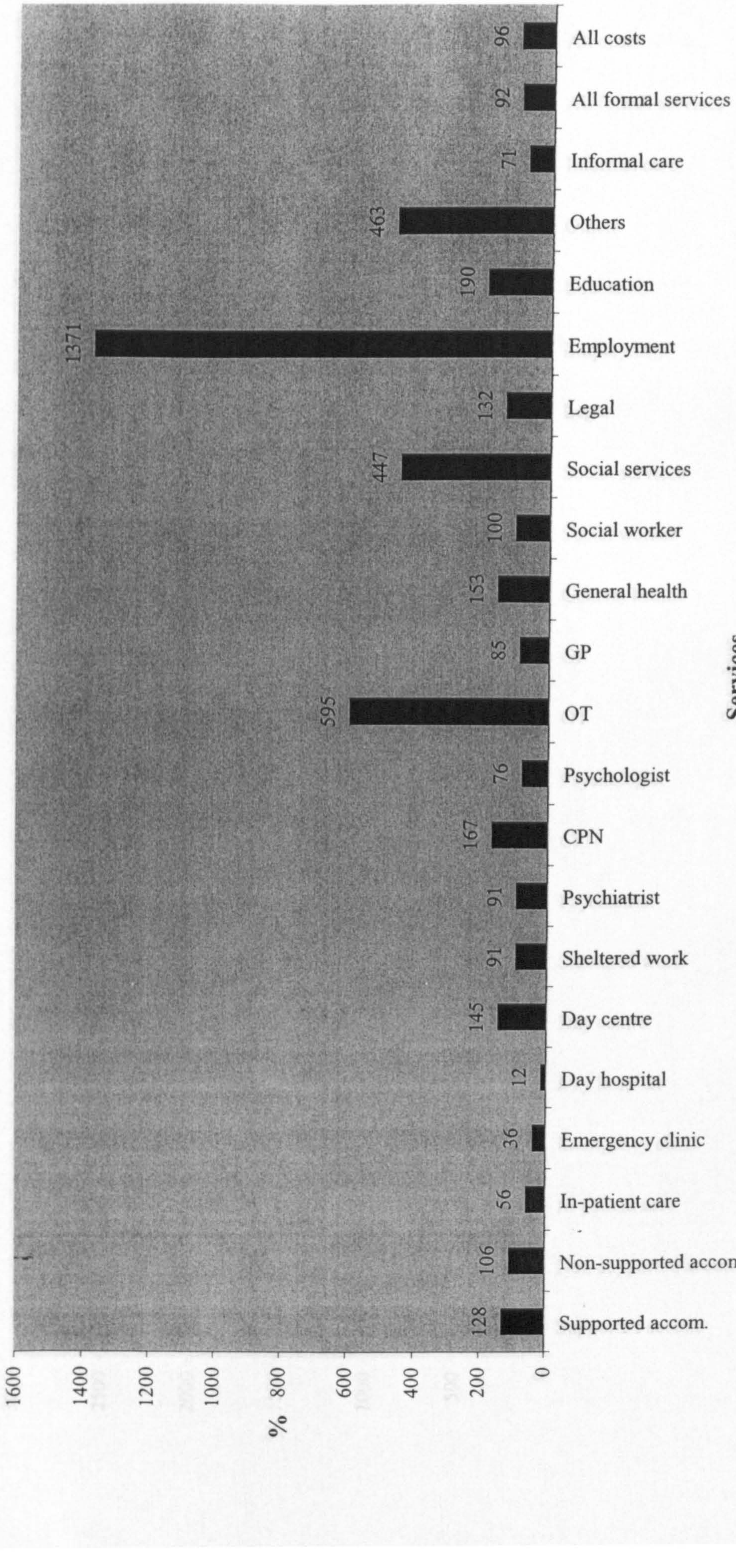


Figure 5.1. Follow-up costs as a percentage of baseline costs; all patients interviewed at baseline and follow-up.

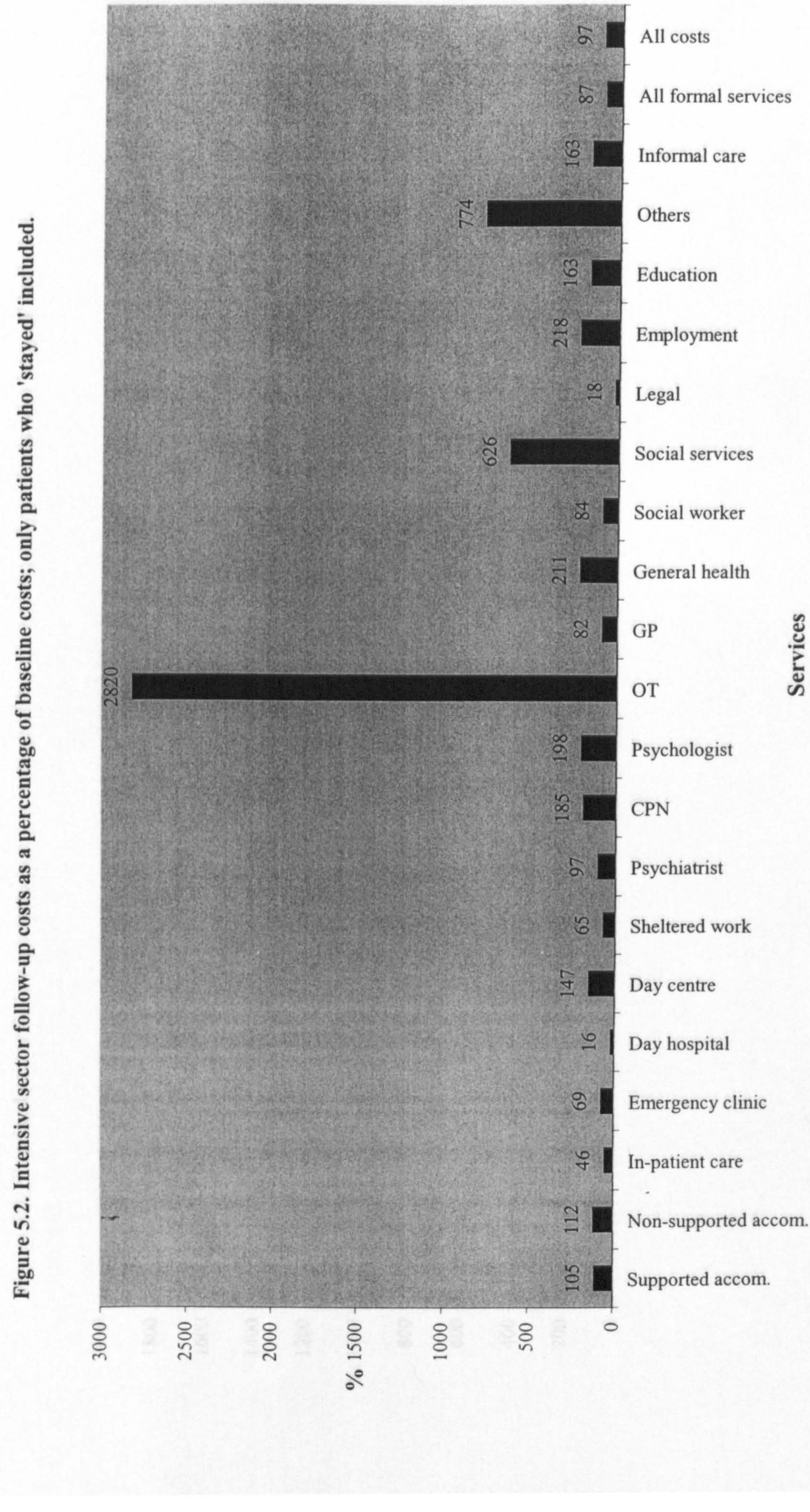


Figure 5.2. Intensive sector follow-up costs as a percentage of baseline costs; only patients who 'stayed' included.

Figure 5.3. Standard sector follow-up costs as a percentage of baseline costs; only patients who 'stayed' included.

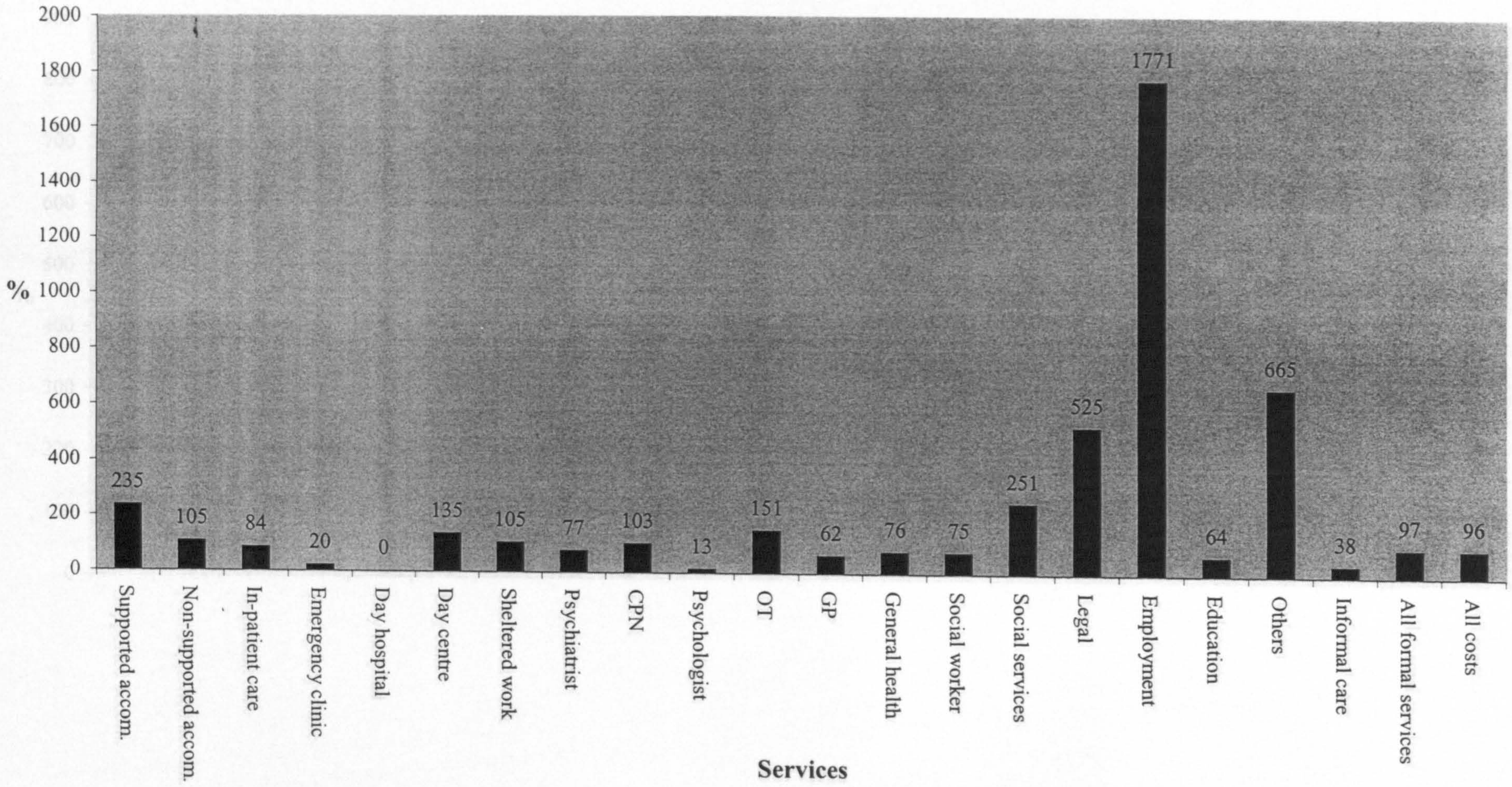


Figure 5.4. Standard sector costs as a percentage of intensive sector costs at baseline; only patients who 'stayed' included.

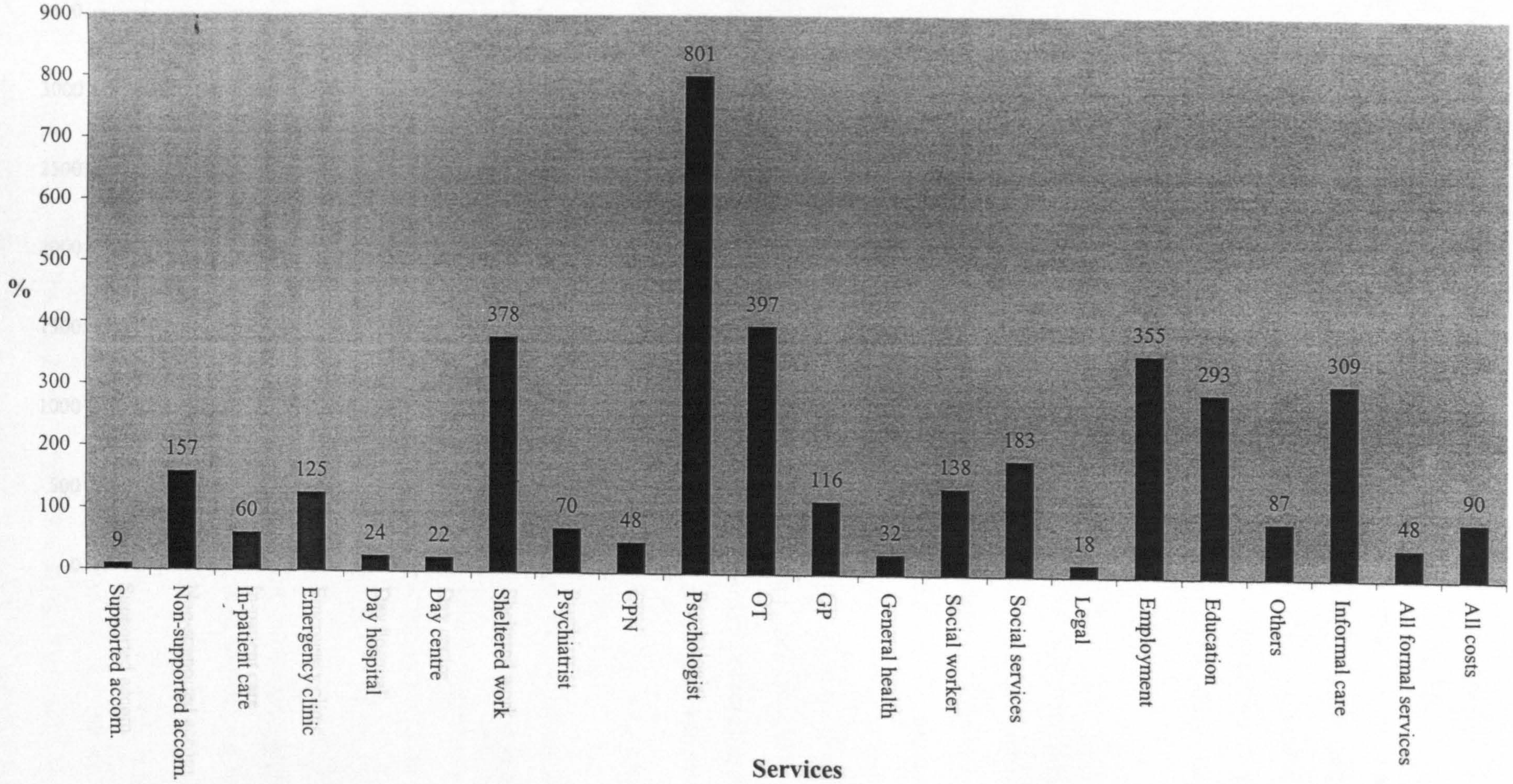
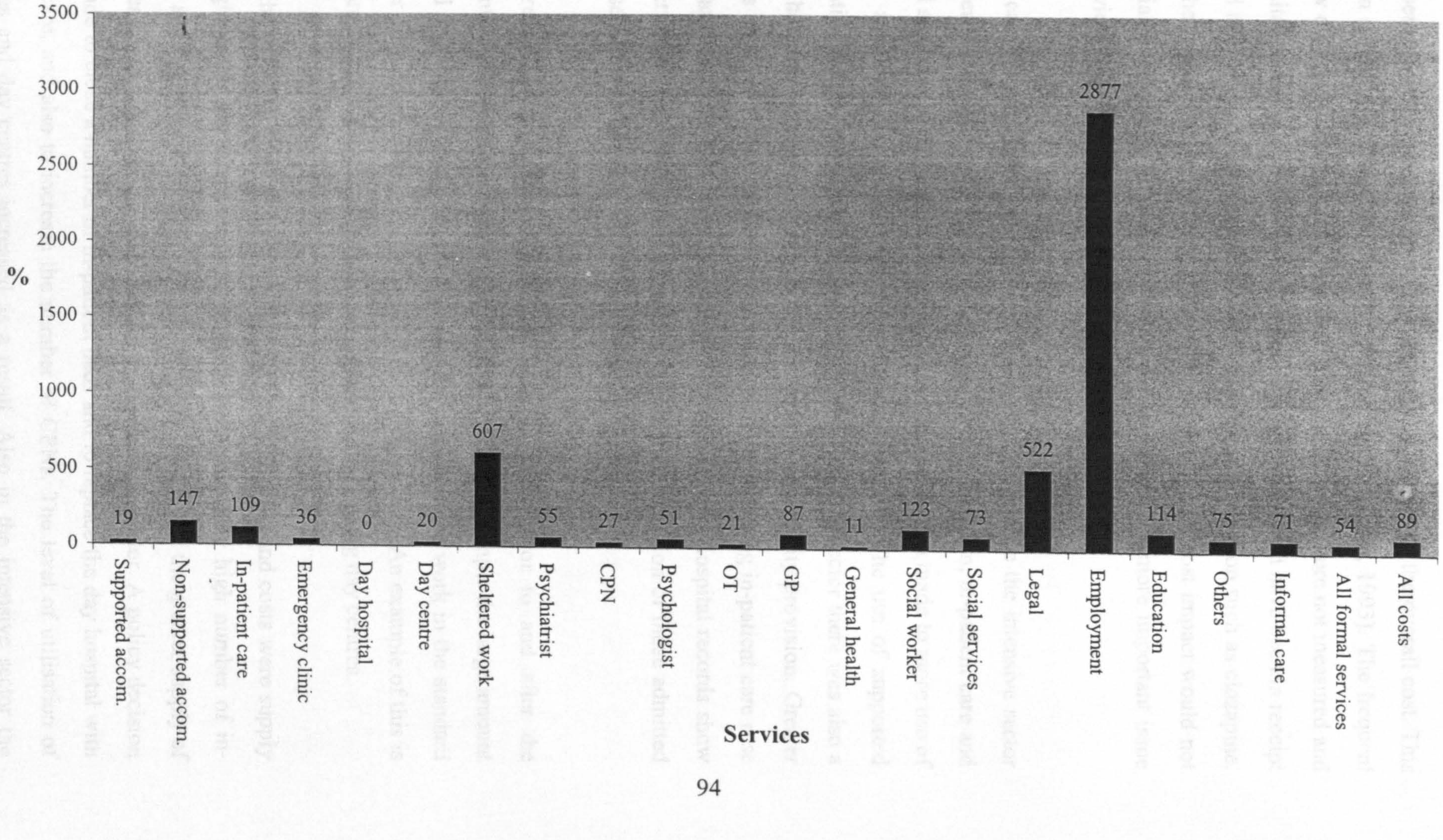


Figure 5.5. Standard sector costs as a percentage of intensive sector costs at follow-up; only patients who 'stayed' included.



small number of services account for a disproportionate amount of the overall cost. This finding is in common with previous studies (Knapp and Beecham, 1993). The frequent use, but low cost of GP services, is of interest. Medication costs were not measured and this is a limitation of the analyses. By follow-up some clients would have been in receipt of new (and relatively expensive) forms of anti-psychotic medication such as clozapine. However, the numbers were unlikely to be high and the *overall* cost impact would not be substantial. If the study to be conducted now this would be a more important issue due to the wider use of such forms of medication.

Patterns of care changed over time in the two sectors. At baseline the intensive sector was characterised by heavy utilisation of supported accommodation, in-patient care and day hospital services. By the follow-up period a transition had been made to more use of day centres and CPNs, whilst the use of in-patient care fell. The use of supported accommodation did not show much change. In the standard care sector there was also a move from hospital based provision of some services to community provision. Greater stability was apparent in this sector. The proportion of people using in-patient care rose in the standard sector, but this was not statistically significant. (Hospital records show that amongst interviewed *and* non-interviewed clients the proportion of those admitted fell in both sectors over time).

Some differences between the two sectors were in place prior to and after the establishment of sectorised community mental health care, for example the large amount of supported accommodation in the intensive sector and sheltered work in the standard sector. Other differences emerged as a result of the developments. An example of this is the large increase in the proportion of intensive sector patients using day centres.

Essentially the major changes that occurred in service utilisation and costs were supply driven. Originally in the intensive sector there were a relatively high number of in-patient beds and day hospital places. It is clear from the results that the greater supply of these services led to a greater use of them than in the standard sector. A policy decision was then made to close a number of in-patient beds and to replace the day hospital with day centre care, and also to increase the number of CPNs. The level of utilisation of CPN services and day centres increased as a result. Also in the intensive sector the

relatively high level of use of supported accommodation was inevitably caused by its very supply. The standard sector did not have such a high level of provision of supported accommodation and therefore use of it was much lower. (When use of supported accommodation did occur by standard sector clients it was often 'out of sector'). Similarly there was a well established sheltered work scheme in the standard sector and the results reveal that use of this type of service was greater than in the intensive sector.

'Supplier-induced demand' is usually discussed in relation to payment schemes for physicians (McGuire et al, 1988). In the United States, for example, the fee for service model may provide an incentive for the physician to maximise treatment whereas a fixed fee model may provide a disincentive to prolong treatment after the cost has risen above the fixed amount. The principal of supplier-induced demand applies here also, although the incentives are quite different and more complex than those of a monetary nature. Whatever the reasons (ideological, political, economic, etc.) for increasing community services at the expense of hospital care, or of deciding to locate a number of residential homes in a particular area, the expectation must be that demand for these services will respond accordingly. For this to happen demand must be relatively passive, and will be if information asymmetry exists. This can mean for example that the client assumes that the physician (or social worker, nurse, etc.) has a level of knowledge about appropriate care and treatment that the client does not have. Schizophrenia and other serious mental illnesses are often chronic and levels of disability high. As a result there may be a high level of supply led demand in mental health care, although whether this is more the case than in other fields of medicine is uncertain. It is probable that there is *some* demand effect causing service utilisation (for example there may be a belief that the quality of community services is greater than hospital services) but it is doubtful that demand is as strong an influence on cost as supply.

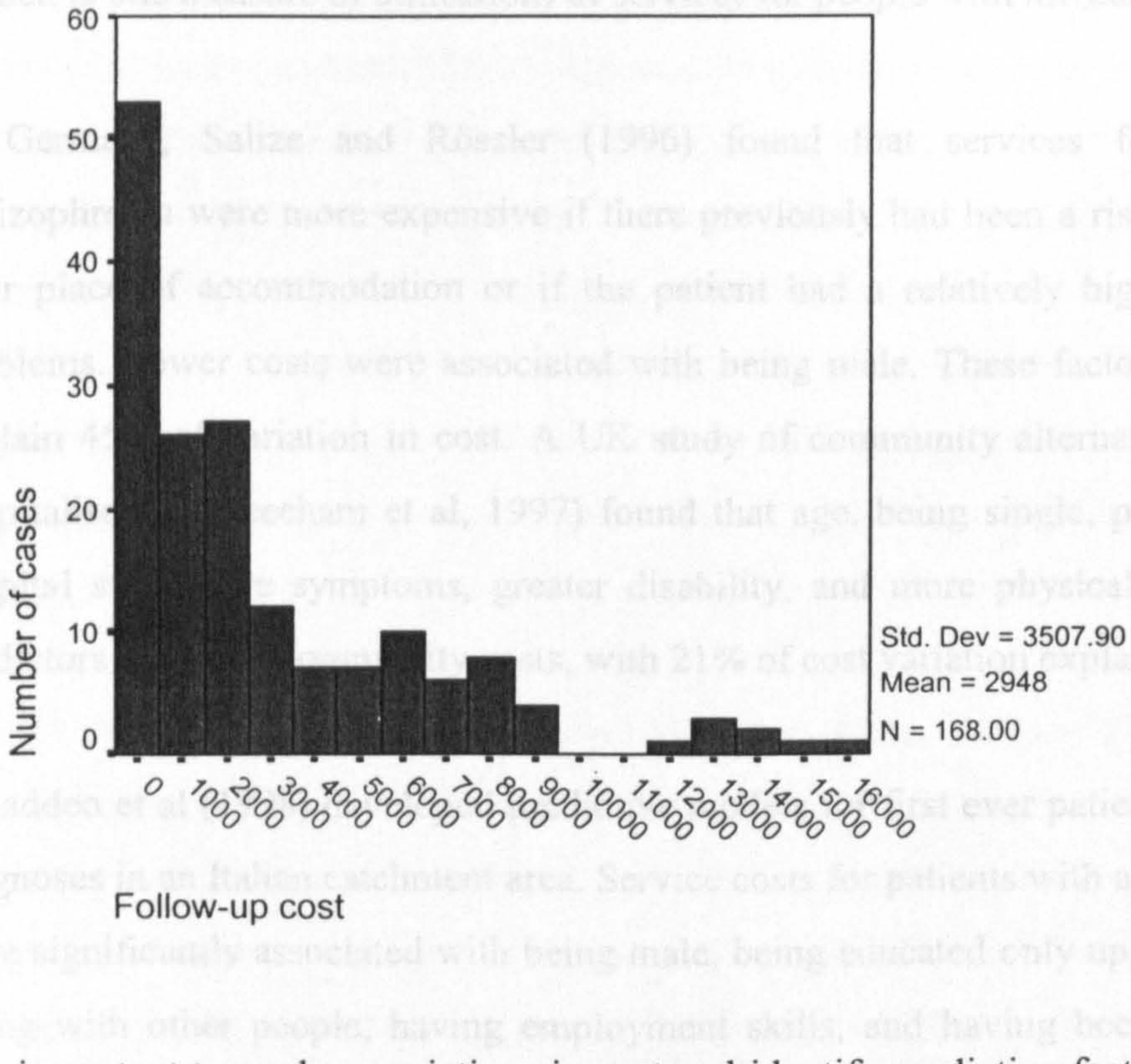
In summary, the significant formal service cost differences between the sectors existed at both baseline and follow-up and as such the cost difference does not appear to have been caused by the intervention in the intensive sector. The intensive sector service was expensive prior to the intervention taking place. The cost reduction in the intensive sector was greater than that in the standard sector as it was mainly caused by the fall in

the use of in-patient care. It is important to examine the factors which were related to cost differences and this is dealt with in the following section.

6. PREDICTORS OF SERVICE COSTS

Section 5 described how service use was measured and costs calculated. Costs were reported at both points in time and for each sector. This section analyses variations in cost and addresses the third of the questions posed in Section 1 – what impact do patient characteristics have on service costs. Figure 6.1 shows that variation in follow-up cost was substantial. (One person has not been included in Figure 6.1. This patient was an in-patient in a special hospital for the entire six month period, and also the six month period prior to baseline interview, and was omitted from the analyses as an outlier).

Figure 6.1. Distribution of six month costs (1995/6 £s) at follow-up.



It is important to explore variations in cost and identify predictive factors for a number of reasons. First, controlling for patient differences is particularly useful when comparisons between treatment modalities have been conducted in the absence of a randomised trial (Knapp, 1998). Second, being able to explore cost variations, and to predict costs, is important in terms of future resource allocation. Third, there are issues

surrounding access and equity – are clients with specific characteristics costing less or more than others?

6.1 Background to cost-prediction models

Anderson and Newman (1973) suggest that health care utilisation may be influenced by societal and individual factors as well as aspects of the prevailing health care system. They cite three types of individual characteristic: predisposing features (age, gender, martial status, previous illness etc), enabling features (family support, income, access to services etc), and illness level features (perceived illness, disability, symptomatology, diagnosis etc). A number of studies have explored similar factors in relation to the cost (which is one measure of utilisation) of services for people with mental health problems.

In Germany, Salize and Rössler (1996) found that services for patients with schizophrenia were more expensive if there previously had been a risk associated with their place of accommodation or if the patient had a relatively high level of social problems. Lower costs were associated with being male. These factors could together explain 45% of variation in cost. A UK study of community alternatives to long-stay hospitalisation (Beecham et al, 1997) found that age, being single, previous length of hospital stay, more symptoms, greater disability, and more physical symptoms were predictors of higher community costs, with 21% of cost variation explained.

Amaddeo et al (1998) developed predictive models for first ever patients with differing diagnoses in an Italian catchment area. Service costs for patients with affective disorders were significantly associated with being male, being educated only up to primary level, living with other people, having employment skills, and having been referred to the psychiatric services by other specialists. For the latter two factors the relationship with cost was inverse. Age was also related to cost but only when squared, which indicates a non-linear effect. Predictors of higher service costs for patients with neurotic or somatoform disorders were being a single male, living alone, being unemployed (but with unemployed men being less expensive than unemployed women), and having been referred to the psychiatric services by family members. Age again had a non-linear

effect on cost. For schizophrenia, costs were higher if the patient was single, and had been educated up to secondary level. Patients living with other people had relatively low costs. Services for patients with other diagnoses were inversely related to being divorced/widowed/separated, and having been referred to the services by other specialist staff. Higher costs for this group were predicted if the referral was unplanned. The amounts of variation in cost explained by these models were 39% for affective disorders, 43% for neurotic and somatoform disorders, 69% for schizophrenia and 20% for other diagnoses.

Knapp et al (1998) conducted an economic analysis of a community based alternative to emergency admission for patients with severe mental illness and were able to account for 36% of cost variations. Costs increased with behaviour problems and social adjustment problems. Lower costs were experienced if the patient had had previous in-patient admissions, and also if the diagnosis was of schizophrenia or mania. There was a non-linear effect of neurotic problems and speech problems on cost. The control group in this study used standard in-patient care, and 28% of cost variation was explained. Social adjustment, behaviour and speech, and neurotic problems had similar effects as with the community based patients. In addition, Black-Caribbean patients had less expensive service packages as did those with more severe delusions and/or hallucinations. Services cost more if patients lived with their relatives when entering the study.

The *baseline* psychiatric costs (therefore excluding social care and other costs) of the current study have also been analysed in order to identify predictive factors (McCrone et al, 1998a). High costs were predicted by previous in-patient and day hospital service use, being born in the UK, and living alone when identified for the study. Lower costs were predicted by age, not being a suicide risk, and a higher level of functioning. The amount of cost variation explained was 35%. However, those analyses were conducted on a sample identified by clinical rather than research diagnosis and as such included a small number of clients not included in the analyses presented in this thesis. In this section comprehensive costs (of which core psychiatric costs are a subset) are analysed for the *follow-up* period. Some of the baseline data was used to predict follow-up costs. This option was not available, however, for the baseline cost analyses.

6.2 Predictor variables

The patient characteristics that were used in the regression models can be grouped according to the work of Anderson and Newman (1973): (i) Pre-disposing features: age, gender, ethnicity, marital status, employment status, geographical mobility, number of children (ii) *Enabling features*: years of education, service satisfaction (iii) Illness features: diagnosis, length of illness, disability, symptomatology, number of unmet needs (iv) Service features: intensive sector 'stayer', intensive sector 'leaver', standard sector 'stayer', standard sector 'leaver'. These were chosen because there were *a priori* reasons to suggest that they might have an impact on cost, although the strength of an association (and even its direction) were not necessarily known. Much of the data was taken from the case identification part of the study, but a number of variables were obtained from the interview stage. Disability was defined as the total score from the Social Behaviour Schedule (Wykes and Sturt, 1986), the total score from the Brief Psychiatric Rating Scale (Overall and Gorham, 1962) was used to measure symptomatology, satisfaction with services was taken from the Verona Service Satisfaction Scale (Ruggeri and Dall'Agnola, 1993), and the number of unmet needs as reported by users was calculated from the Camberwell Assessment of Need (Phelan et al, 1995). These four scores related to the baseline interview period so that it could be seen whether or not follow-up costs had 'reacted' to prior situations. (The same measures were taken at follow-up, but including them as potential predictors of follow-up costs would present problems of endogeneity - the costs variations might well be explained by these measures but the causation could also run in the opposite direction. Using measures from the *previous* time period avoids this problem).

Dummy variables were created to represent the service model used by the individual clients. The different service categories were: intensive sector 'stayer' (clients who lived in, or received care from, the intensive sector during the follow-up cost period), intensive sector 'leaver' (original intensive sector clients who were living elsewhere during the follow-up cost period), and two corresponding dummy variables for the standard sector. The dummy variable representing standard sector 'stayers' was used as a reference category against which the other three were compared.

6.3 Analyses

Two models were constructed. In the first, the independent variables were entered together. In the second, variables were removed sequentially until only those with a p-value below 0.1 remained. However, the variables which indicated where the patient lived were not removed as they were seen to be of specific importance to the analyses. Although the second model contains a model with a small number of variables, most of which are statistically significant, there are a two main reasons for preferring to include all variables in the results. First, the variables chosen are expected to influence cost. It is interesting, therefore, to see whether they have a positive or inverse effect on cost, and also how statistically significant or insignificant they actually are. Second, there are concerns that selection techniques, such as backward elimination, results in incorrect significance levels (Derksen et al, 1992).

The dependent variable used in the analyses was the six month service cost (all cost items except for non-supported accommodation) at follow-up, i.e. after the community mental health services had been developed. The residuals of the model were checked for normality which is a necessary condition of the ordinary least squares linear regression model.

6.4 Cost prediction results

The final regression equations are shown in Table 6.1. The full model shows that cost increases significantly with age and disability. However, the longer the length of illness, the lower the service costs. There was also an inverse relationship between cost and years of education. Clients who had children had significantly lower costs than those who did not. The whereabouts of the clients during the cost period reveals that services provided to intensive sector stayers were £1828 more expensive than those provided to the standard sector stayers. Intensive sector and standard sector leavers were £2371 and £4639 more expensive than standard sector stayers respectively. The corresponding cost differences when other characteristics were *not* controlled for were £2347, £2813 and £4760 (for the 118 clients who this model relates to). This implies that the uncontrolled

results overestimate the cost difference between intensive and standard sector 'stayers' by £519, overestimate the difference between standard sector 'stayers' and intensive sector 'leavers' by £442, and overestimate the difference between standard sector 'stayers' and 'leavers' by £121. Along with the other variables included, this model could explain over 40% of cost variation.

Table 6.1. Regression of follow-up service cost on patient characteristics.

Characteristic	Full model (n=118) B	SE	P	Reduced model (n=128) B	SE	P
Age (years) [a]	74	27	0.007	58	24	0.018
Male [a] (1=yes, 0=no)	717	770	0.354			
White ethnicity [a] (1=yes, 0=no)	-404	720	0.576			
Single, widowed, divorced or separated [a] (1=yes, 0=no)	533	908	0.559			
Children [b, c] (1=yes, 0=no)	-1312	691	0.060	-1553	578	0.008
Years of education [b, c]	-408	114	0.001	-358	100	<0.001
Moved since baseline [b,c] (1=yes, 0=no)	-626	875	0.476			
Open employment [b] (1=yes, 0=no)	44	1422	0.975			
Diagnosis of schizophrenia [a,b] (1=yes, 0=no)	320	689	0.643			
Length of illness (years) [a]	-72	33	0.034	-64	29	0.028
Symptomatology score (max. = 168) [b]	39	32	0.221	53	27	0.051
Disability score (max. = 85) [b]	81	40	0.048	71	34	0.039
Level of service satisfaction (max. = 5) [b]	52	625	0.934			
Number of unmet needs (max. = 22) [b]	161	221	0.467			
Number of physical health problems (max. = 15) [b]	134	167	0.426			
Intensive sector 'stayer' [c] (1=yes, 0=no)	1828	686	0.009	1784	614	0.004
Intensive sector 'leaver' [c] (1=yes, 0=no)	2371	1541	0.127	2023	1225	0.101
Standard sector 'leaver' [c] (1=yes, 0=no)	4639	1334	0.001	4602	1096	<0.001
Constant	1774	3306	0.593	3124	1933	0.109
	R^2 = 0.413 Adjusted R^2 = 0.306 F statistic = 3.871 Significance of F <0.001			R^2 = 0.359 Adjusted R^2 = 0.311 F statistic = 7.357 Significance of F <0.001		

[a] case identification data

[b] baseline interview data

[c] follow-up interview data

The second model, consisting only of statistically significant variables, showed that service costs were positively related to age, symptoms, and disability. An inverse relationship existed between cost and education, length of illness and whether the client had children. The variable indicating whether or not the client was an intensive sector

leaver was no longer statistically significant. Slightly over one third of cost variation could be explained by the reduced model. In both the full and reduced model the residuals were relatively normally distributed and did not suggest that the dependent variable should be transformed in any way.

6.5 Discussion of cost prediction equation

The cost prediction models enabled the explanation of over one third of cost variations, which, although not great, is comparable with other studies. One patient was though excluded from the analyses as they were an extreme outlier. They had service costs amounting to £34,213 over six months which was twice as much as the next most expensive patient. Inclusion of this patient had the effect of reducing the amount of variation explained by ten percentage points and also created a very skewed distribution of outliers.

Service costs were seen to rise with age. However, at baseline it has been shown that age was negatively associated with core psychiatric service costs (McCrone et al, 1998a). The cost raising impact of age has though been found for former long stay patients in the UK (Beecham et al, 1997). Costs are lower for people who have been in contact with mental health services for a relatively long period - a finding that needs careful consideration given the age-cost association. Costs might rise with age because people lose the support of informal carers, or because expensive residential services tend to be more geared towards older than younger people. Finding that costs are greater earlier on in a service history might be explained by people being less stable and having more crises in the early part of their illness.

It has also been found that costs were inversely associated with the number of years of education that individuals have received. Educational attainment may be a proxy for poverty or lower social class and studies have shown that prevalence of mental illness is greater amongst people in lower socio-economic groups (Bruce, 1990). Our finding shows that *within* the population of severely mentally ill people, the resource requirements may be higher for those in this category.

An important, and expected, finding was that disability (measured in terms of social behaviour at baseline) was predictive of higher costs. In addition, patients with more symptoms also had higher service costs. These two findings imply that resources are being used relatively more by patients with greater clinical need. However, the number of unmet needs at baseline was not linked to increased service costs, as might have been expected.

The model of mental health care received is a significant predictor of service costs. Of those clients who remained within their geographical area, those in the intensive sector were nearly £2000 more expensive than those in the standard sector. However, standard sector clients who moved out of the area were almost £5000 more expensive than those who remained. No such differential between intensive sector stayers and leavers emerged. If the clients who left the sectors had remained, the cost difference between the two models of care would have been reduced - assuming that services received out of sector by 'leavers' would have been available to them within the original sectors. The latter caveat is crucial because a key reason for the expensive care received by standard sector leavers was the relatively low level of supported accommodation within the area. Of the eight standard sector individuals living in supported accommodation during the cost period, five did so *out of sector*. This has important implications for continuity of care. Twenty nine intensive sector originals lived in supported accommodation, but only six did so out of sector. Such a 'supply side factor' is clearly specific to the locality. However, it does reflect the possibility of clients moving away from particular areas due to differences in the provision of expensive residential care. Potential standard sector accommodation costs were transferred to other areas, and consequently so were their costs for other services.

It is important to point out the possibility that differences in movement out of or into the sectors could have existed before the study started, reflecting different clinical practice between the sectors and different provision of residential care within the sectors. This may mean that despite their apparent demographic similarities, they actually had substantially different clinical populations to start with which is crucial to consider in comparing the sectors.

The patients who left the standard sector were not representative because of the accommodation supply effect, and this has implications for the way in which evaluations are conducted. If only those clients who remained in the areas were included in the analyses then the difference between the two sectors would have been exaggerated. An 'intention to treat' analysis where original patients are compared would have overcome this but it would not have informed us as to some of the reasons for cost variations. Multiple regression analysis with dummy variables to indicate patient whereabouts does perform this role.

A number of patient characteristics have been shown to predict service costs for individuals with mental health problems. These analyses have shown that their appears to be a service supply effect which accounts for much of the cost differential. Other factors not included here will also have an impact on service costs. These include *current* levels of need, disability and symptoms as well as attitudes of patients and staff concerning service expectations.

One of the implications of these findings is that policy makers, service planners and administrators need to recognise that some of those attending mental health services will utilise higher levels of resources for reasons in addition to those of a clinical nature. While it might have been expected that background characteristics would impact on cost, some of these factors have here been identified. In addition, these analyses reveal that patient movements between areas due to supply side effects have important economic consequences for mental health services.

7. COST-OUTCOMES OF SECTORISED COMMUNITY MENTAL HEALTH CARE

One of the key aims of the *PRiSM Psychosis Study* is to determine whether community based services are efficient, and whether an intensive model of care is more or less efficient than standard care. It has been shown in Section 5 that the intensive sector service was substantially more expensive than that in the standard sector, both at baseline and follow-up. This does not though imply that care provided in the intensive sector is inefficient because it may be that outcomes were greater. This section first describes the different ways in which costs can be combined with outcomes. Second, the changes in the main outcome measures used in the *PRiSM Psychosis Study* are examined. The third section synthesises cost and outcome data in the form of cost-outcome ratios. There are a number of difficulties in applying such ratios in this study and these are discussed at the end of the section.

7.1 Methods of economic evaluation

Economic evaluation is concerned with the synthesis of information on costs and outcomes. A number of different forms of evaluation have been developed reflecting the wide range of activities to which economic analysis can be applied. These have in common the fact that costs are measured in monetary units but they differ in the way in which outcomes are treated.

7.1.1 Cost-minimisation analysis (CMA)

Some health care interventions have outcomes which are known to be identical. In such scenarios, cost-minimisation comparisons can be made as there is no requirement for outcome to be measured. The option which is least expensive *is* the most efficient. This type of analysis is only appropriate if outcomes are known *a priori*. This is unlikely to be the case in evaluations of mental health care services, and with regard to the *PRiSM Psychosis Study* there was the expectation that differences would occur between hospital

based and community orientated services. As such, cost-minimisation analysis was not deemed to be suitable.

7.1.2 Cost-benefit analysis (CBA)

CBA uses outcomes measured in monetary units. An intervention is considered to be efficient if the monetised outcomes exceed the costs. The range of outcomes that can be measured in monetary units has though generally been limited to those related to 'productive' activities, most notably employment. Mental health services often aim to improve many aspects of a patients life, of which employment opportunities may only be one, and therefore CBA was also not considered to be suitable for the *PRiSM Psychosis Study*. (An new way of approaching cost-benefit analysis is to use 'willingness to pay' methods to value outcomes. This is theoretically attractive but such methods have rarely been used in mental health care).

7.1.3 Cost-effectiveness analysis (CEA)

With CEA outcome is measured along a single domain that is usually illness specific. Cost-effectiveness is achieved by an intervention saving money with no change or no deterioration in outcome, or by producing a specific improvement in outcome at the lowest possible cost. There may be some procedures where outcome is reduced slightly, but large cost savings are made (Doubilet et al, 1986), and this may be clinically or socially acceptable. Because CEA as defined here involves a single outcome measure it was not chosen for use in the *PRiSM Psychosis Study* which sought to assess the impact of community mental health services in a number of domains.

7.1.4 Cost-utility analysis (CUA)

CUA has emerged in recent years as a means of comparing health interventions and potentially prioritising expenditure. Economic theory informs us that individuals seek to maximise utility (or value) by consuming 'goods'. Health and health care are such goods. Health economists tend to assume that quantity of life is an acceptable proxy for utility. The most notable tool used in this form of analysis is the quality adjusted life year (QALY), and Weinstein and Stason (1977) provide an early account of this approach. However, QALYs have been used in very few evaluations of mental health

care services, and their suitability needs to properly assessed before any routine use of them is made.

7.1.5 Cost-consequences analysis (CCA)

It is recognised that in some areas of health care it is inappropriate and impractical to focus on one single measure of outcome as in CEA. This is especially the case with mental health care where many facets of an individual's life are effected by mental illness and the treatments and therapies provided. CCA is similar to CEA in that non-monetised, generally illness-specific, outcome measures are combined with costs - but with CCA a number of ratios are constructed. This does mean that an overall definitive assessment of the worth of an intervention may not be possible (if conflicting ratios are the result) but it does introduce a much needed measure of pragmatism into how judgements are made. The *PRiSM Psychosis Study* has included a number of different outcome measures in order to determine the effectiveness of sectorised community mental health care services. As such it is felt that cost-consequences analysis is the most appropriate way in which costs and outcomes can be synthesised.

7.2 Outcome measurement

The outcome measures used in the study have been described in Section 4. The mean scores from these measures which have been used to construct cost-outcome ratios are shown in Table 7.1 for both time periods, along with the difference between these means and the percentage of the sample who improved over time. The data in the table only relates to those clients who were interviewed at baseline and follow-up, and for whom cost information was available at follow-up.

In interpreting these figures it is important to note that for some instruments (BPRS, CAN, SBS) an-increase represents a worsening in the particular domain, and for others (GAF, LQOLP, SNS, VSSS) an increase represents an improvement in the domain. For the sake of consistency, the figures that show the difference between the mean scores have a negative sign if there was a deterioration and are positive if there was an improvement.

Table 7.1. Outcome measures at baseline and follow-up; both sectors combined.

Instrument[1]	Summary score	N	Outcome Measure			
			Mean at baseline	Mean at follow-up	Difference in score	% sample improved
BPRS	total score	136	33.64	33.92	-0.28	47.1
CAN	number of unmet needs	124	1.41	1.85	-0.44 **	25.8
GAF	total	132	59.43	61.98	2.55	57.6
GAF	symptoms	134	62.85	64.90	2.05	54.5
GAF	functioning	135	61.87	63.93	2.06	51.9
LQOLP	Cantril's ladder	132	6.09	6.16	0.07	47.0
LQOLP	uniscale	113	3.84	4.13	0.29 *	43.4
LQOLP	perceived	138	4.48	4.52	0.04	52.2
SBS	total score	136	9.93	7.85	2.08 **	60.3
SNS	total names	129	12.78	16.04	3.26 ***	65.9
VSSS	global satisfaction	113	3.77	3.70	-0.07	40.7

[1] See pages 42-44 for instrument details

Paired t-test * p<0.1, ** p<0.05, *** p<0.01, **** p<0.001

Note: a negative sign indicates a deterioration in the relevant domain and a positive sign indicates an improvement.

As each instrument is rated in a particular way, and on a specific scale, the final column (the percentage of people who improved) is most informative. Only one quarter of the sample experienced a reduction in their number of unmet needs. The next worst outcome was for global satisfaction. About two thirds of the sample experienced an increase in social network size and slightly less improved on social behaviour. Approximately half the sample improved on the other measures. A number of the people in this sample had actually moved out of the intensive and standard care sectors. However, given national trends it is probable that they would still have been living in an area where community based services were developed or developing.

7.3 Cost-consequences of community based care

For the efficiency of community orientated services to be examined it is necessary to combine outcome data with cost information. In the current exercise the ratio between

the cost of the community based services (i.e. at follow-up) and the outcomes achieved (i.e. follow-up minus baseline) is of interest. In Table 5.7 it was seen that the mean six month cost of formal services for the 169 people in the follow-up sample was £3076. However, Table 7.1 shows that the number of clients for whom outcome data was available was less than 169. As ratios between costs and outcome were to be generated it was felt important to use the mean cost that was specific to each outcome measure. Table 7.2 gives the mean formal service cost for each outcome scale, and relatively high variations in costs are revealed. There is probably no systematic reason for these cost differences but it is still important to ensure that the correct figures are used.

Table 7.2. Mean six month costs at follow-up by instrument; both sectors combined.

Instrument[1]	Summary score	N	Mean formal service costs (1995/6 £s)
BPRS	total score	136	3098
CAN	number of unmet needs	124	3095
GAF	total	132	3611
GAF	symptoms	134	3614
GAF	functioning	135	3591
LQOLP	Cantril's ladder	132	2843
LQOLP	uniscale	113	2986
LQOLP	perceived	138	2994
SBS	total score	136	3569
SNS	total names	129	3014
VSSS	global satisfaction	113	3220

[1] See pages 42-44 for instrument details

A cost-outcome ratio is defined as the cost divided by the change in the outcome measure. Different ratios can be generated. First, we can divide the mean follow-up service cost by the difference between the mean outcome scores at baseline and follow-up. However, this is not particularly informative because the scales used for the different instruments are different. These ratios are not reported in this thesis. An alternative method involves dividing the mean follow-up cost by the percentage of the sample who improved over time. This ratio informs us of the cost associated with a one percentage

point increase in the number of people improving. It appears to be least expensive to increase the success rate in improving social network size, improving perceived quality of life and decreasing social behaviour problems (Table 7.3). To gain a one percentage point increase in the number of people improving on unmet needs is most costly. This method makes comparisons between the different outcome measures relatively straightforward. However, it is only concerned with whether people improved and not with the magnitude of the change. In a clinical setting, though, it may be the case that standardised measures are not used but it should be noticed if a patient improved or did not following treatment.

Table 7.3. Cost-outcome ratios of community mental health services; both sectors combined.

Instrument[1]	Summary score	Cost:% sample improved
BPRS	total score	66
CAN	number of unmet needs	120
GAF	total	63
GAF	symptoms	66
GAF	functioning	69
LQOLP	Cantril's ladder	60
LQOLP	uniscale	69
LQOLP	perceived	57
SBS	total score	59
SNS	total names	46
VSSS	global satisfaction	79

[1] See pages 42-44 for instrument details

7.4 Cost-consequences of intensive verses standard community care

Up to now this section has considered the cost-consequences of community provision of care *per se*. It is though important to compare the cost-consequences of the different forms of community care operating in the two sectors. The relevant sample for this comparison consists of those patients who had a baseline and follow-up outcome measure (so that changes in outcomes can be calculated), a follow-up measure of service

costs, and who received care from either the intensive sector or the standard sector at the follow-up time point. The difference between this sample and that discussed above is that all patients who moved out of the sectors are now excluded.

The outcome measures for the intensive sector clients show that for eight of the eleven measures most clients improved (Table 7.4). Three quarters of clients showed improvements in terms of social networks, but less than one fifth had reduced unmet needs. The standard sector clients were more likely to improve on social behaviour and show a deterioration in unmet needs (Table 7.5). On only three of the eleven measures did most clients improve over time.

Table 7.4. Outcome measures at baseline and follow-up for intensive sector; 'stayers' only.

Instrument[1]	Summary score	N	Outcome Measure			
			Mean at baseline	Mean at follow-up	Difference in score	% sample improved
BPRS	total score	59	32.93	33.00	-0.07	44.1
CAN	number of unmet needs	54	0.94	1.80	-0.86 ****	18.5
GAF	total	56	57.45	60.84	3.39	58.9
GAF	symptoms	56	60.71	64.84	4.13	66.1
GAF	functioning	56	57.88	63.39	5.51 *	58.9
LQOLP	Cantril's ladder	55	6.38	6.38	0.00	49.1
LQOLP	uniscale	41	3.88	4.37	0.49 **	51.2
LQOLP	perceived	60	4.46	4.46	0.00	55.0
SBS	total score	57	12.12	7.72	4.4 ***	64.9
SNS	total names	55	9.00	13.87	4.87 ****	76.4
VSSS	global satisfaction	45	3.65	3.70	0.05	51.1

[1] See pages 42-44 for instrument details

Paired t-test: * p<0.1, ** p<0.05, *** p<0.01, **** p<0.001

Table 7.5. Outcome measures at baseline and follow-up for standard sector; 'stayers' only.

Instrument[1]	Summary score	N	Outcome Measure			
			Mean at baseline	Mean at follow-up	Difference in score	% sample improved
BPRS	total score	59	33.14	34.05	-0.91	47.5
CAN	number of unmet needs	53	1.43	1.87	-0.44 *	22.6
GAF	total	55	61.73	66.89	5.16 **	63.6
GAF	symptoms	57	65.61	68.00	2.39	49.1
GAF	functioning	58	65.09	67.71	2.62	50.0
LQOLP	Cantril's ladder	59	6.08	6.17	0.09	45.8
LQOLP	uniscale	58	3.83	3.98	0.15	39.7
LQOLP	perceived	60	4.62	4.59	-0.03	48.3
SBS	total score	58	8.14	5.72	2.42 **	67.2
SNS	total names	56	16.38	17.57	1.19	55.4
VSSS	global satisfaction	53	3.82	3.63	-0.19	34.0

[1] See pages 42-44 for instrument details

Paired t-test * p<0.1, ** p<0.05, *** p<0.01, **** p<0.001

The mean formal service costs for the samples for whom complete outcome measures were available at baseline and follow-up are shown in Tables 7.6 and 7.7. These show that there is a wider variation in service costs within the intensive sector (lowest is 75% of highest) than the standard sector (88%).

Cost-outcome ratios for the intensive sector have been calculated and are shown in Table 7.8. This reveals that an one percentage point improvement in the number of people having improved social networks costs £50, whereas a similar improvement in unmet needs costs £207. Table 7.9 shows that a similar cost is associated with a one percentage point increase in the number of people improving in terms of total functioning, social behaviour and social networks. Again, improvements in unmet needs are associated with the highest cost.

Table 7.6. Mean six month costs at follow-up by instrument for intensive sector; 'stayers' only.

Instrument[1]	Summary score	N	Mean formal service costs (1995/6 £s)
BPRS	total score	59	3758
CAN	number of unmet needs	54	3836
GAF	total	56	4444
GAF	symptoms	56	4444
GAF	functioning	56	4444
LQOLP	Cantril's ladder	55	3342
LQOLP	uniscale	41	3711
LQOLP	perceived	60	3619
SBS	total score	57	4375
SNS	total names	55	3800
VSSS	global satisfaction	45	3791

[1] See pages 42-44 for instrument details

Table 7.7. Mean six month costs at follow-up by instrument for standard sector; 'stayers' only.

Instrument[1]	Summary score	N	Mean formal service costs (1995/6 £s)
BPRS	total score	59	2154
CAN	number of unmet needs	53	2214
GAF	total	55	2244
GAF	symptoms	57	2301
GAF	functioning	58	2269
LQOLP	Cantril's ladder	59	2016
LQOLP	uniscale	58	2084
LQOLP	perceived	60	2059
SBS	total score	58	2269
SNS	total names	56	2016
VSSS	global satisfaction	53	2286

[1] See pages 42-44 for instrument details

Table 7.8. Cost-outcome ratios of community mental health services in the intensive sector; 'stayers' only.

Instrument[1]	Summary score	Cost:% sample improved
BPRS	total score	85
CAN	number of unmet needs	207
GAF	total	75
GAF	symptoms	67
GAF	Functioning	75
LQOLP	Cantril's ladder	68
LQOLP	Uniscale	72
LQOLP	Perceived	66
SBS	total score	67
SNS	total names	50
VSSS	global satisfaction	74

[1] See pages 42-44 for instrument details

(nc = not calculated due to zero denominator)

Table 7.9. Cost-outcome ratios of community mental health services in the standard sector; 'stayers' only.

Instrument[1]	Summary score	Cost:% sample improved
BPRS	total score	45
CAN	number of unmet needs	98
GAF	total	35
GAF	symptoms	47
GAF	functioning	45
LQOLP	Cantril's ladder	44
LQOLP	uniscale	52
LQOLP	perceived	43
SBS	total score	34
SNS	total names	36
VSSS	global satisfaction	67

[1] See pages 42-44 for instrument details

Other things being equal, a low cost-outcome ratio is to be preferred to a high one as this means that more 'units' of output are being achieved for a given cost. A negative cost-effectiveness ratio may be even more attractive as it suggests that reducing service costs produces more favourable outcomes. A comparison of the cost-outcome ratios reported in the Tables 7.8 and 7.9 reveals that the standard sector 'outperformed' the intensive sector on all measures. On the face of it we would conclude from this evidence that the standard sector is more efficient.

However, there are difficulties with the analyses as they stand. Greater outcome is achieved for a given cost in the standard sector than in the intensive sector, but this could just be caused by the low cost of services in the standard sector regardless of possibly greater outcomes in the intensive sector. It might be the case that policy makers, professionals, service users and the general public believe that it is worth paying more to achieve better results. This always needs to be considered when comparing 'absolute' cost-outcome ratios in this way. In the United States a prioritisation exercise based on cost-outcome ratios found that tooth capping was technically more efficient than appendectomies (Hadorn, 1991) - a clear example of the need to use value judgements when interpreting such figures.

It is frequently stressed that economic costs should be measured at the margin i.e. the cost of one more unit of activity. Likewise, cost-consequences analysis requires that we examine the extra cost of achieving extra outcomes and incremental cost-outcome ratios are used for this purpose. The definition of an incremental cost-outcome ratio is the incremental costs of one treatment over another divided by the incremental outcomes (Drummond et al, 1997). The difference between the intensive sector and the standard sector on the eleven outcome measurements and service cost is reported in Table 7.10. Here a positive number shows that the intensive sector improved more than the standard sector, or in the case of costs was more expensive. The intensive sector outcomes were greater for GAF symptoms and functioning, the uniscale and perceived measures of quality of life, social network size and global satisfaction. The standard sector performed better on needs and the total GAF score. The other measures (symptomatology, Cantril's ladder and social behaviour) favoured either the intensive or standard sector depending on whether the absolute change in the outcome measure was

used or the percentage of the sample who improved. Cost was always greater in the intensive sector, although the variation is quite marked according to which outcome measure is used. The intensive sector clients therefore experienced somewhat greater improvement in outcome than did those in the standard sector.

The incremental cost-outcome ratios can be calculated by dividing the difference in costs by the difference in outcomes as in Table 7.11. It can be seen, for example, that for the intensive sector to achieve a one percentage point increase over the standard sector in clients improving their social network size a mean cost of £85 would accrue. To gain a similar 'advantage' for reducing unmet needs would actually mean reducing costs by an average of £396.

Table 7.10. Difference between intensive sector and standard sector for outcome measurements; 'stayers' only.

Instrument[1]	Summary score	N	Intensive sector – Standard sector		
			Change in score	% sample improved	Cost
BPRS	total score	118	0.84	-3.4	1604
CAN	number of unmet needs	107	-0.42	-4.1	1622
GAF	total	111	-1.77	-4.7	2200
GAF	symptoms	113	1.74	17.0	2143
GAF	functioning	114	2.89	8.9	2175
LQOLP	Cantril's ladder	114	-0.09	3.3	1326
LQOLP	uniscale	99	0.34	11.5	1627
LQOLP	perceived	120	0.03	6.7	1560
SBS	total score	115	1.98	-2.3	2106
SNS	total names	111	3.68	21.0	1784
VSSS	global satisfaction	98	0.24	17.1	1505

[1] See pages 42-44 for instrument details

Table 7.11. Incremental cost-outcome ratios of intensive sector compared to standard sector; 'stayers' only.

Instrument[1]	Summary score	N	Incremental cost: incremental % sample improved
BPRS	total score	118	-472
CAN	number of unmet needs	107	-396
GAF	total	111	-468
GAF	symptoms	113	126
GAF	functioning	114	244
LQOLP	Cantril's ladder	114	402
LQOLP	uniscale	99	141
LQOLP	perceived	120	233
SBS	total score	115	-916
SNS	total names	111	85
VSSS	global satisfaction	98	88

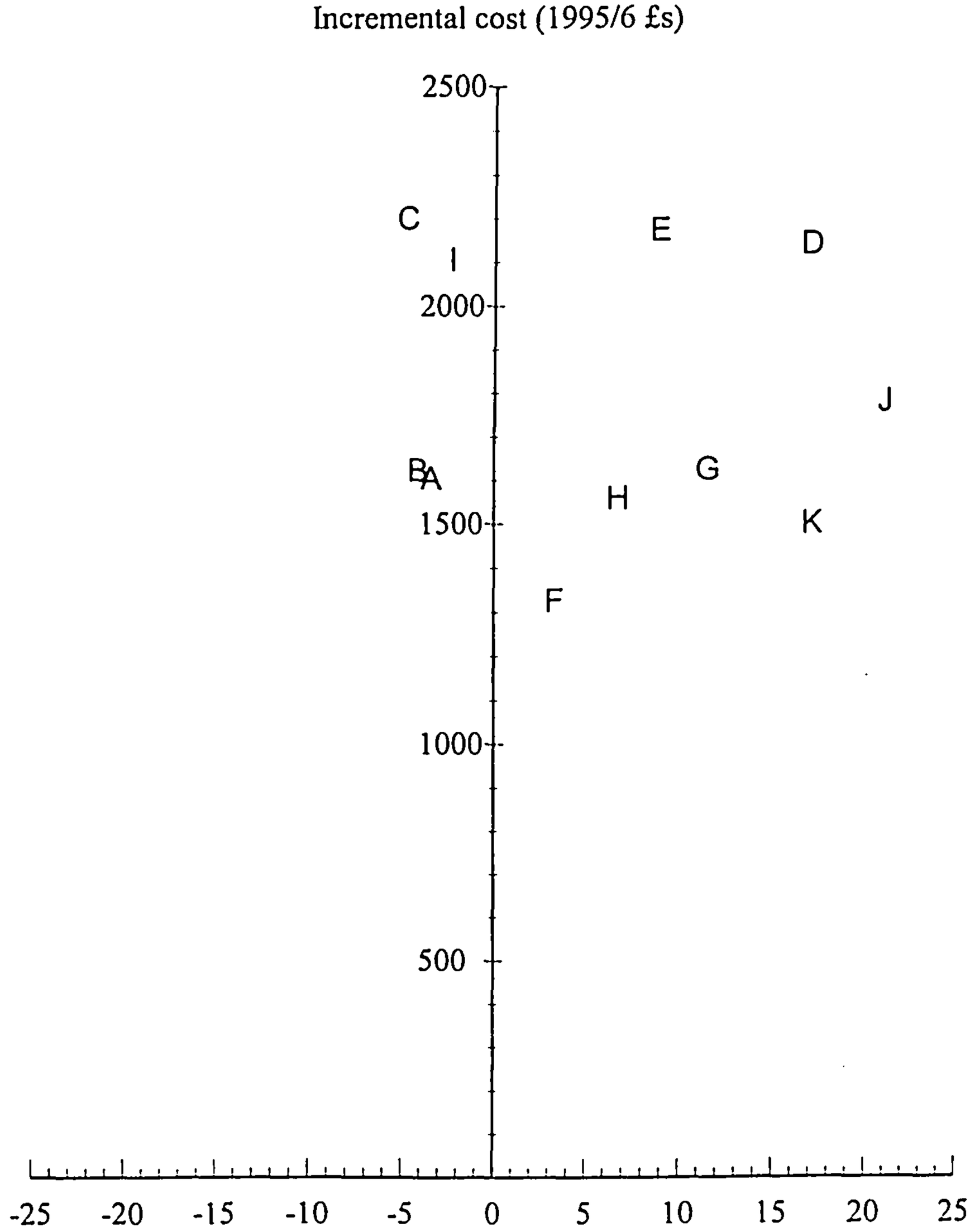
[1] See pages 42-44 for instrument details

Comparing the incremental cost-consequences for the above measures can also be done graphically (Figure 7.1). This reinforces the impression that the intensive sector clients improve more than the standard sector clients but at a higher cost.

7.5 Limitations

It has been shown that there is a lack of uniformity, with unmet needs rising, social behaviour and social networks improving, and other domains (e.g. perceived quality of life) showing limited change. This is important as it appears that the community services that were being evaluated were either not wholly effective or there were other factors at work which influenced outcomes also. In this section the outcomes have been treated in isolation from each other. However, in reality there will be a certain amount of interaction present. For example, it may be the case that improvements in social behaviour and social networks lead to a greater confidence in individuals. This in turn may lead to a greater recognition by clients of needs that are unmet. If this is the case then the outcome showing that unmet needs have risen may not actually be negative. In a similar way the findings that social behaviour (as rated by key workers) improved but

Figure 7.1. Incremental costs and outcomes of intensive sector compared to standard sector.



A BPRS
B CAN
C GAF
D GAF
E GAF
F Cantril
G Uniscale
H Perceived QoL
I SBS
J SNS
K VSSS

subjectively rated service satisfaction did not improve may not be contradictory. Improved social behaviour (or reduced disability) may encourage statements of service dissatisfaction just as readily as service satisfaction – there is not a definitive reason why they should move in the same direction. Another reason for the divergent results may be that the services are unable to deal with every facet of life. Although an inclusive approach was taken to outcome measurement this was very much driven from the research side. Clinical teams would probably have been overwhelmed if they thought that for every client they had to improve quality of life, service satisfaction, social behaviour, functioning, social networks, physical health and symptomatology, as well as reducing needs and the negative effects on informal carers.

There is no single outcome measure that is regarded as the gold standard. Some community mental health care programmes have a specific goal, such as vocational rehabilitation (Mueser et al, 1998), and this influences the research design. However, in programmes such as those evaluated here a general service is provided to a catchment area population. Given the diversity of the clientele, narrow goals are perhaps not appropriate and therefore a broad based evaluation is suitable. This does though make economic evaluation complex. In other areas of health care research a single outcome measure can be identified which adequately encapsulates the effects of treatment. This allows cost-effectiveness ratios to be calculated. As was pointed out earlier this study uses a cost-consequences approach but we have seen that this does not produce a definitive answer. One alternative would be to use quality adjusted life years (QALYs) which in theory measure the 'utility' of an individual. Quality of life has generally been used as a proxy for utility, but the Lancashire Quality of Life Profile which was used here has not been used to generate QALYs, which require quality of life to be measured on a scale running from zero (death) to one (full health). Cantril's Ladder is a rating scale component of the Lancashire Quality of Life Profile and could potentially be used for this purpose. However, there are a number of difficulties in applying the QALY method to mental health care (Chisholm et al, 1997). In particular the generation of the quality of life score on which the QALY relies can be particularly complex, and if a generic measure is used (as is generally suggested) then this may not be sensitive enough to detect changes in mental health related quality of life. Further research is required in this area.

The cost-outcome ratios that have been presented in this section are informative and provide a way of observing how outcomes have changed over time in relation to costs. However, a focus on the average change, or average percentage change, does not reveal the numbers of people improving or deteriorating. Reporting of this figure may be of clinical importance. Absolute cost-outcome ratios favour the standard sector because of its substantially lower service costs. However, by calculating incremental cost-outcome ratios it has been shown that the intensive sector often has better outcomes but at a high cost. It remains therefore a value judgement as to whether these extra costs are acceptable. However, there are a number of important limitations.

First it has been implicitly assumed that the change in outcome has been produced by the expenditure of resources as measured by follow-up costs. Costs were measured over a period of six months, whereas the outcome change was observed over a period of about two and a half years. This may still be valid but only as long as the six month cost period is largely representative of costs between the two interview dates. Second, because this is not a randomised controlled trial it is not known that it is the services which are causing changes. Patient characteristics may have a significant influence which should be taken into account. Third, it is unclear what *elements* of service cost, if any, influence outcome. (This would also be a problem were this to be a randomised controlled trial as there would still be a number of individual services). Fourth, the wide range of outcome measures make a definitive judgement concerning cost-outcome effects complicated. Fifth, the starting point is of major importance when analysing change. If an individual starts off with, for example, a low level of functioning then there is more room for improvement over time.

These difficulties are symptomatic of some of the advantages of the study. First, a randomised controlled trial was inappropriate as the aim was to compare routine care that was provided within two catchment areas. Hence a quasi-experimental approach was chosen, whilst recognising that certain sample characteristics needed to be controlled for. Second, the comprehensive nature of the costing exercise meant that a large number of services were included. This presented a challenge in terms of disentangling the impact of specific care inputs. Third, the difficulty in determining whether the services were effective and efficient was caused by the fact that mental

health problems effect a number of areas of life and to understand this a variety of outcome measures were required which could (and did) move in opposite directions. The following section approaches the question of cost-outcomes in an alternative way which takes into account some of the difficulties mentioned above.

8. PRODUCTION OF MENTAL HEALTH

Section 7 has shown that the intensive sector appeared to be more efficient than the standard sector using some measures, with the standard sector being more efficient on others. Often though the situation arose whereby the intensive sector produced better outcomes *but at a higher cost*. The limitations discussed at the end of the Section 7 mean that some caution should be employed in drawing definitive conclusions from the cost-outcome ratios. Having said this, they do serve to describe the costs and outcomes in a relatively straightforward way. This section takes the process further by examining the impact that individual services have on outcome in the form of a mental health production function.

8.1 Background to production functions

In traditional economic theory, outputs are produced by 'firms'. A variety of inputs (traditionally land, labour and capital) are required to produce these outputs, and altering the mix of these affects the quantity produced. This theory can be applied to healthcare. Here the patient is considered to be the producer or firm (Hart, 1995) and health gain is the desired output. The individual produces health gain by engaging in different activities, which are effectively inputs to the production process. Such inputs include leisure activities, employment, and use of health and other services.

The health production function theory fits into a general framework that examines the demand for health (Grossman, 1972). It assumes that individuals can affect their state of health by consuming, to a greater or lesser extent, health care and other health influencing 'inputs' (Wagstaff, 1986). The health production function describes how health itself is-determined by the range of inputs that the individual consumes. In addition health is affected by the environment to which the individual is exposed. The consumption of inputs is assumed to be determined by preferences that the individual has for health and other 'products' (which may not be beneficial to health) and by their 'budget constraint', which indicates the combinations of health influencing inputs and

other inputs that can be purchased with their time and money. As is common with many production functions in economics it is also assumed that the amount by which health improves following consumption of any input falls as the latter increases. In other words, the health production function exhibits decreasing returns to scale. The assumption that individuals decide how much health care to consume may not fully hold in the mental health care arena if, as appeared to be shown in Section 5, the supply of services induces the demand for them. This may be due to factors such as the asymmetry of information and knowledge about conditions and treatments. In addition, there is sometimes the compulsory use of services such as in-patient care. Nevertheless, it is still valid to examine the impact of health care inputs on health itself even if the demand for these is relatively passive. The assumption of decreasing returns to scale is possibly too restrictive. Whilst it would be expected that the gains produced from increased health care use will diminish, it is also possible that up to a point there will be *increasing* returns to scale. For example, one out-patient appointment for a client who is relatively unwell may not cause a desired improvement – an optimal course of treatment might consist of, say, six sessions. Therefore, there may be increasing and then decreasing returns to scale.

Health, therefore, may be derived from factors which might or might not include health care itself. Although health services produce health care they do not necessarily produce health. The role of individuals and households in producing health, and the effect of health care on health itself, has been studied at a macroeconomic level. Auster et al (1969) examined the effect of health care expenditure and environmental factors on mortality in the United States. They discovered that high levels of education were related to lower rates of mortality. In contrast to other studies, high income was associated with higher mortality. Such environmental factors had more impact on mortality than did health care expenditure. Another paper has looked specifically at the impact of different lifestyles on health (Kenkel, 1995), and it was found (not surprisingly) that smoking, drinking, exercise, and schooling were all related to health outcomes.

The activities of individuals are then important determinants of their health (Fuchs, 1966). The freedom of individuals to choose how to spend their time, and the choices

available to them give rise to a *household production function*. The household production of health can be defined as "A dynamic behavioural process through which households combine their (internal) knowledge, resources, and behavioural norms and patterns with available (external) technologies, services, information, and skills to restore, maintain, and promote the health of their members" (Berman et al, 1994).

The literature reporting production functions for mental health care at the level of the individual are scarce. Knesper et al (1987) sought to examine the impact that time spent with mental health professionals had on outcome, as measured by the Global Assessment Scale (Endicott et al, 1976). Most of the change in functioning was explained by the initial level of functioning. The hours of staff input were significant for some patient sub-groups but not all. The analysis controlled for a number of patient characteristics.

Increasing or decreasing the level of certain activities may then have favourable or adverse effects on health gain. In addition there may also be particular patient characteristics which are influential. This section seeks to answer the fourth question asked in Section 1 - what impact do service costs have on outcome?

8.2 Difficulties in constructing mental health production functions

The aim of a health care production function is to explore the impact that inputs have on outcome. We are not (here) interested in the impact that outcomes have on inputs. However, we might expect both relationships to exist. In the first case it would be expected that an optimal service package would produce favourable results for the patient. In the second case a particular mental health outcome could lead to later changes in the service inputs needed and received. For example, if there is a large decrease in a patient's level of disability then it would be likely that the level of in-patient care required would fall.

The existence of these two types of relationship does not present insurmountable statistical difficulties as long as the measurement of service inputs and patient outcomes

relates to temporally distinct periods. If, say, we were to measure a patient's level of symptomatology on day 1 and then measure service use and costs that arise between day 2 and day 20, and then finally measure symptomatology again on day 21 we should be able to quantify the effect that the services had on changes in symptomatology. However, mental health research rarely allows such 'tidy' phases of measurement. Two reasons explain this. First, due to limited resources in terms of research time and expenditure, service use and patient outcomes are usually measured at the same time. This is clearly something that is *technically* not difficult to overcome. Second, and more importantly, measures of clinical status, disability, etc do not typically relate to one point in time. It is more often the case that the measure will use the previous month or even the previous year as the period of interest. In the above example, if symptomatology measured on day 1 and day 21 referred to the previous week then it is unclear to what extent service inputs would effect outcome because they are measured for a period during which symptomatology is also measured. The latter could impact on the former. This is known as endogeneity and can cause estimation difficulties. (For example, using ordinary least squares to estimate the impact of service inputs on outcomes in such a situation is inappropriate as the dependent variable also influences the independent variables).

In the *PRiSM Psychosis Study* there were some measures that *did* only relate to one point in time. Therefore, it is possible to use ordinary least squares regression analysis to examine the impact that service inputs have on these. For other measures the problem of endogeneity exists. The most common statistical method to tackle this problem is *two stage least squares*, and a production function is described later which uses this method.

8.3 Impact of service costs on quality of life

The production function presented here used the Lancashire Quality of Life Profile (Oliver, 1991) which allows a number of measures of quality of life to be generated. Quality of life is an important measure as it is by definition broad and encompasses many aspects of a patient's health and well being. In addition it is also used in tools such as Quality Adjusted Life Years (Weinstein and Stason, 1977). However, QALYs as

generally used, do not contain a disease specific measure of quality of life as has been done here.

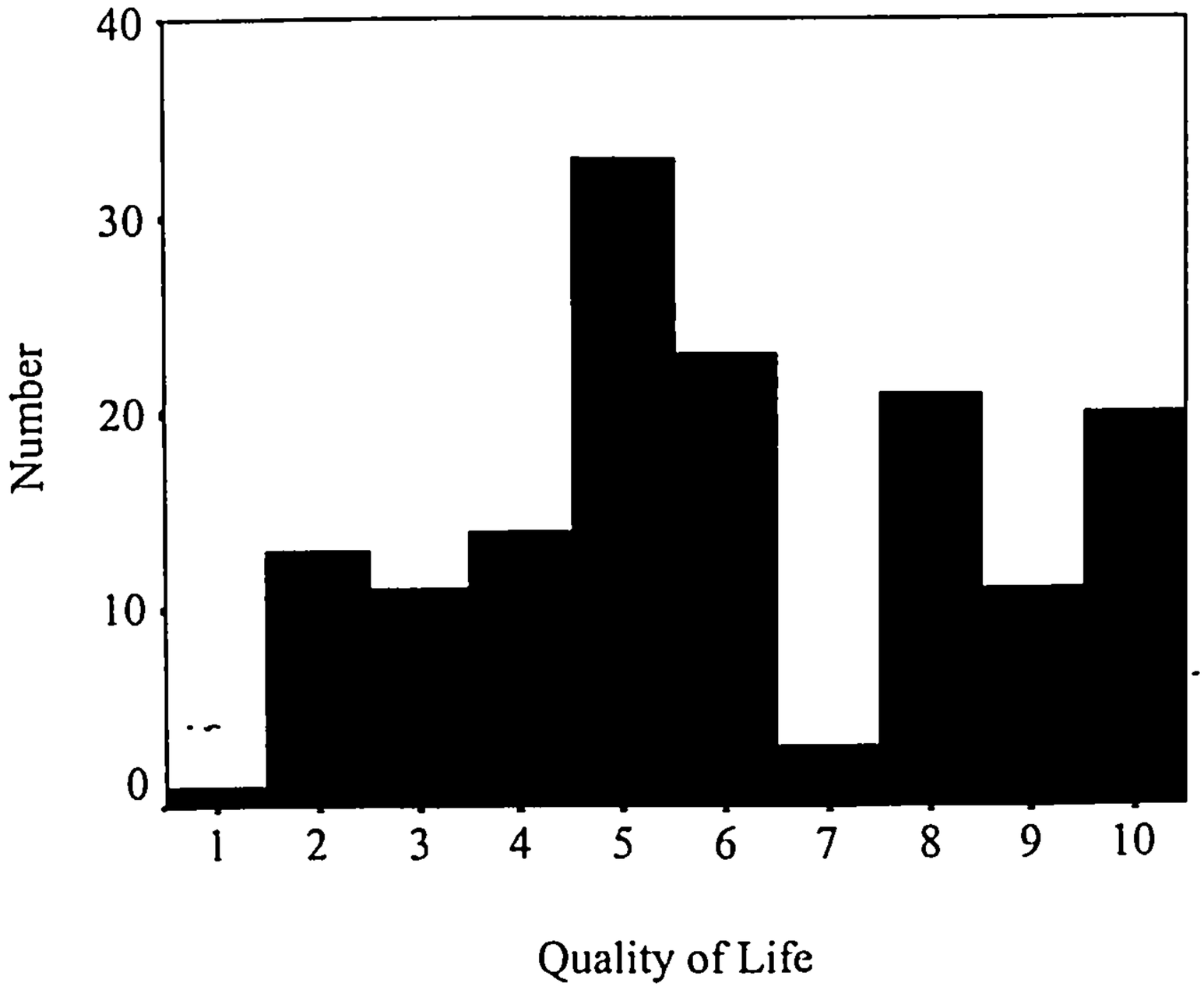
The Lancashire Quality of Life Profile includes Cantril's Ladder (Cantril, 1963). This has been used in a variety of different ways and in diverse pieces of research. In the Lancashire Quality of Life Profile, Cantril's Ladder measures the quality of life of an individual pertaining at one time point (the present). As such it can not influence service costs that occurred prior to it. The patient is presented with a picture of a ladder, the top of which represents the very best level of quality of life possible with the bottom representing the very worst possible level. The patient is asked to mark on the ladder the point at which they feel they are at present. The patient can place their point anywhere on the ladder and as such this is a continuous scale (within an upper and lower bound). The end points of the ladder are described as the best and worst situations which the patient can imagine they could be in. The distance between the bottom of the ladder and the point marked by the patient was measured and re-calibrated so that the maximum score was ten and the minimum zero. The distributions of quality of life scores at baseline and follow-up are shown in Figures 8.1 and 8.2.

Quality of life would be influenced to some extent by patient characteristics regardless of what services were provided. It was therefore important to attempt to standardise for these factors when examining the impact of resource use. In Section 6 factors that it was thought might have an influence on cost were included in the cost prediction equation. These were chosen because they described features that pre-disposed clients to use services, features that enabled them to access services and features that described their illness (Andersen and Newman, 1973). These were a broad range of factors and it is logical to assume that they may also have an impact on the degree to which services effect quality of life. Sturm et al (1999) suggest that "Quality of life and cost measures are influenced by many factors beyond the health intervention and this heterogeneity leads to high variances even within clinically homogenous groups." If we assume that quality of life is a proxy for utility then we are implying that these factors enter into the client's utility function. The factors for standardisation were as follows: age, gender, ethnicity, country of birth, marital status, years in contact with psychiatric services (variables obtained from the case identification exercise); years of education, number of

Figure 8.1. Distribution of quality of life score at baseline.

mean = 6.13, standard deviation = 2.73, median = 6.15

Figure 8.2. Distribution of quality of life score at follow-up.



mean = 6.09, standard deviation = 2.52, median = 6.15

children (PRiSM socio-demographic questionnaire); number of physical health problems (Physical Health Index); diagnosis (SCAN, OPCRIT), disability (Social Behaviour Schedule); and symptomatology (Brief Psychiatric Rating Scale). Two additional variables were included indicating whether the observation was for baseline or follow-up (a cluster method was used – see below) and whether the patient was originally from the standard or intensive sector.

Twelve service cost variables were included in the model: informal care, supported accommodation, non-supported accommodation, community psychiatric nurse, psychiatrist/psychologist, general health care services (GP, dentist, optician, general hospital services, chiropodist, acupuncture and physiotherapist), social services (social worker, home help and meals-on-wheels), day care (day hospital, sheltered workshop and day centre), occupational services (occupational therapy, employment services and educational services), legal services (prison, police, court, probation and solicitor), emergency clinic and in-patient care. Service use and costs have been described in detail in Section 5. It was decided here to combine some services (GP with other general health care services; psychiatrist with psychologist; day hospital with sheltered workshop and day centre; and occupational therapy with employment and educational services) because of low numbers for some services, for example psychologists, and because of the need to limit the number of independent variables entering the model (even after pooling baseline and follow-up data).

For the purposes of modelling the health production function it was assumed that non-service related activities would not influence quality of life. This is a limitation as we would expect that activities such as socialising, exercise, going to the pub, going to church, etc. would have an impact. However, data was not collected for these factors, and this represents a weakness in the study.

8.4 Analysis

Multiple regression analysis using Stata (Release 6) was used to examine the impact of the above patient factors and service costs on quality of life. The cluster option was used

which allowed baseline and follow-up data to be combined. Clustering on the patients identification number meant that robust standard errors would be generated. Inclusion of a variable indicating which time period an observation related to enabled the significance of differences between baseline and follow-up to be examined. All the independent variables were entered together. As with Section 6 both the full and reduced (after backwards elimination of statistically insignificant variables) models are presented. Service costs were squared and cubed in order to test for non-linear relationships between costs and quality of life. To enter all such transformations together would 'overload' the model. Therefore, the squared and cubed terms were entered to the model for each service cost in turn and were removed if they were not statistically significant. (It is recognised that this is a departure from the ideal of entering all theoretically eligible variables into the model, but this was considered to be unavoidable).

8.5 Results of production function analysis

The full-model production function is detailed in Table 8.1. For these analyses service costs were measured in units of £100. This was decided following earlier models which showed that £1 changes in cost had a very small impact on outcome measures. The coefficients shown indicate the 'unique' contribution made by each variable with the others all taken into account. The quality of life score runs from 0 to 10. The coefficients in the table have been multiplied by ten so that they indicate the percentage point change in quality of life following a unit change in the independent variables. Few of the background characteristics of patients had a strong impact on quality of life. The impact of the sector variable was extremely limited. The variable indicating which time period was of relevance was also statistically not significant.

Symptomatology and physical health were strongly associated with quality of life in the expected direction. For each extra physical health problem that patients had, the quality of life would reduce by an average of 2.7 percentage points. A one unit increase on the BPRS measure of symptomatology was associated with a 0.5 percentage point fall in quality of life. The number of confidants that a patient had was positively linked to

quality of life - one extra confidant was associated with an increase in quality of life by 0.7 percentage points.

Quality of life was positively related to CPN, social service, general health care and supported accommodation costs. Higher non-supported accommodation costs were also linked to higher quality of life although the probability that the coefficient would in other circumstances be equal to zero was over 0.1. There were no services for which high costs had a statistically significant negative impact on quality of life, although legal services and psychiatrist/psychologist did have p values only slightly over 0.1.

Quality of life was influenced by in-patient costs, but it can be seen by the presence of the squared and cubed terms that this was not a linear relationship. Figure 3 shows that quality of life falls when in-patient costs are between £100 and £14,200. After this quality of life improves until in-patient costs reach £38,110. (In fact the maximum in-patient cost amongst the sample was £33,977). No other squared or cubic terms were statistically significant. Overall around one quarter of variation could be explained by this regression equation. The reduced model (Table 8.2) shows that after elimination of statistically insignificant variables the same service cost variables with the exception of supported accommodation are strong predictors of quality of life.

8.6 Discussion of production function results

Increased costs of CPN, social services, general health care services and accommodation produce higher levels of quality of life. These findings are encouraging because they suggest that increasing service inputs for these services - after taking disability and other factors into account - does benefit patients. Use of in-patient care reduces quality of life but this is reversed for in-patient costs in excess of £14,200 (which is approximately equal to 100 days). Given the emphasis that is often placed on community alternatives to in-patient care we might have expected to see a strong negative impact of it on quality of life. This is indeed the case for most patients, but for the few who require prolonged lengths of stay their quality of life eventually improves. This is to be expected. To require lengths of stay in excess of 100 days the patient concerned would usually be

particularly ill or disabled, and eventually in-patient care should start to improve the patient's subjective quality of life. (Length of stay in the study was calculated by summing across all in-patient episodes during the six month cost period. However, it is likely that any combination of stays that add up to more than 100 days would have high individual lengths of stay).

Table 8.1. Regression of quality of life score on background characteristics and service cost variables (full model).

Variable	Coefficient	Standard error	P value
Time period (1=baseline, 2=follow-up)	-3.29	0.269	0.223
Sector (1=intensive, 2=standard)	-0.70	0.322	0.828
Age	0.19	0.015	0.213
Gender (1=male, 0=female)	-1.37	0.342	0.688
Marital status (1=married or cohabiting, 0=other)	3.49	0.393	0.376
Children (1=has children, 0=no children)	4.57	0.321	0.156
Ethnicity (1=White, 0=other)	-2.61	0.393	0.508
Birthplace (1=UK, 0=other)	2.82	0.363	0.438
Number of years of education	0.07	0.050	0.881
Years since first contact	0.10	0.017	0.562
Diagnosis (1=schizophrenia, 0=other)	-0.32	0.302	0.916
Disability(0=lowest level , 77=highest level)	-0.04	0.019	0.835
Symptomatology (0=lowest level, 168=highest level)	-0.47	0.017	0.007
Number of physical health problems (0=lowest level, 15=highest level)	-2.74	0.062	<0.001
Number of confidants	0.65	0.033	0.050
In-patient cost	-0.49	0.019	0.011
In-patient cost squared	0.005	0.0002	0.017
In-patient cost cubed	-0.000009	0.0000004	0.034
Psychiatrist/psychologist cost	-0.59	0.040	0.144
Emergency clinic	-1.20	0.243	0.622
CPN cost	0.69	0.029	0.018
Day care cost	-0.14	0.017	0.413
General health services cost	0.27	0.015	0.080
Social services cost	0.65	0.020	0.001
Occupational services cost	-0.34	0.045	0.450
Legal services cost	-1.27	0.093	0.175
Informal care cost	0.06	0.010	0.546
Supported accommodation cost	0.20	-0.010	0.047
Non-supported accommodation cost	0.14	0.011	0.183
Constant term	76.06	1.313	<0.001

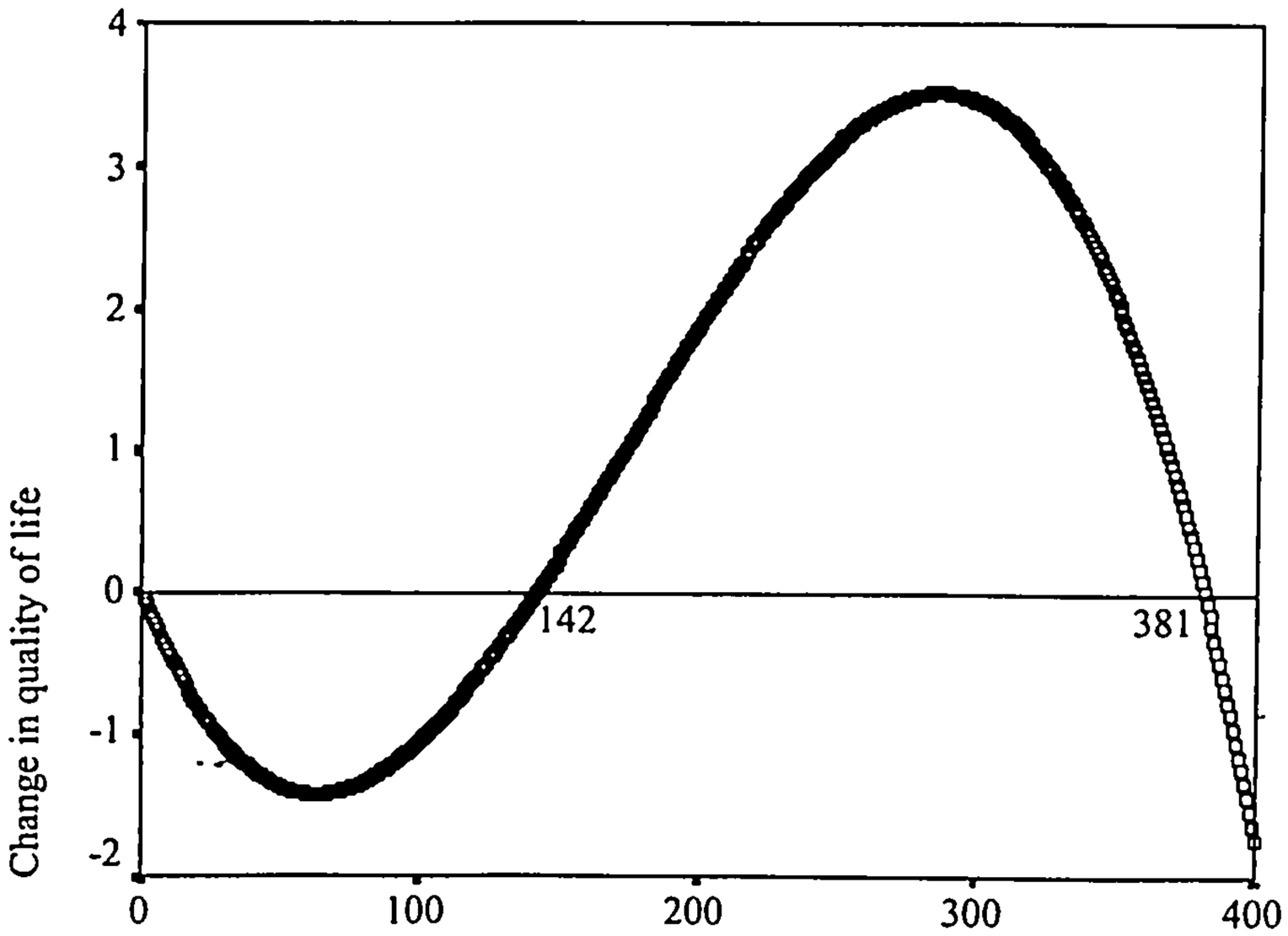
N=339, number of clusters=207, R^2=0.2669

Table 8.2. Regression of quality of life score on background characteristics and service cost variables (reduced model).

Variable	Coefficient	Standard error	P value
Age	0.27	0.010	0.005
Children (1=has children, 0=no children)	5.14	0.294	0.082
Symptomatology (0=lowest level , 168=highest level)	-0.49	0.015	0.002
Number of confidants	0.67	0.028	0.016
Number of physical health problems (0=lowest level, 15=highest level)	-2.88	0.061	<0.001
In-patient cost	-0.51	0.019	0.007
In-patient cost squared	0.005	0.0002	0.022
In-patient cost cubed	-0.000009	0.0000005	0.047
CPN cost	0.69	0.027	0.013
General health services cost	0.27	0.016	0.092
Social services cost	0.55	0.018	0.003
Constant term	74.01	0.768	<0.001

N=339, number of clusters=207, R^2=0.2354

Figure 8.3. Impact of in-patient costs on quality of life.



This production function was encouraging as it did show that service costs had a measurable effect on quality of life. However, it does have some limitations. First, the fact that quality of life was measured at a particular time might present problems if that time-point was especially unusual. Second, we have not measured change but rather examined variations in quality of life regardless of what it was like at an earlier point in time. Third, the use of Cantril's Ladder could be criticised. Rating scales are often prone to respondents marking near to the centre point or to one of the extremes. However, in this case the extremes are determined by the patient and therefore this drawback is perhaps less apparent. Fourth, subjectively measured quality of life might not detect all the therapeutic benefits of care. It was interesting that the inputs of psychiatrists/psychologists had a negative impact on quality of life. It could be the case that in the long term quality of life would rise following such care, but in the short term patients might not see the benefits of it. The same applies for length of in-patient stay up to 100 days. This is important as it suggests that quality of life is not as comprehensive a measure as is often suggested, and as such the QALY method of evaluating services is probably not appropriate to psychiatry unless it is supplemented with other measures. Clinical measures of, say, disability and symptomatology might be better at detecting the effects of certain psychiatric services. We must not though downplay the relevance of quality of life as it is important to take a holistic stance and to elicit patient's own views when evaluating a broad system of community mental health services. Finally, there may be factors which were not included in the model which influence both quality of life and costs. This would present estimation difficulties. However, an inclusive approach was taken with regard to the factors which were included and therefore this should not be a major problem.

8.7 Measuring change

The production function described above identified service costs that produced certain levels of quality of life. Next we try to identify service costs that produce *changes* in a patient's level of disability, here measured by the Social Behaviour Schedule. This measure showed much change between baseline and follow-up which makes it interesting to look at in the form of a production function.

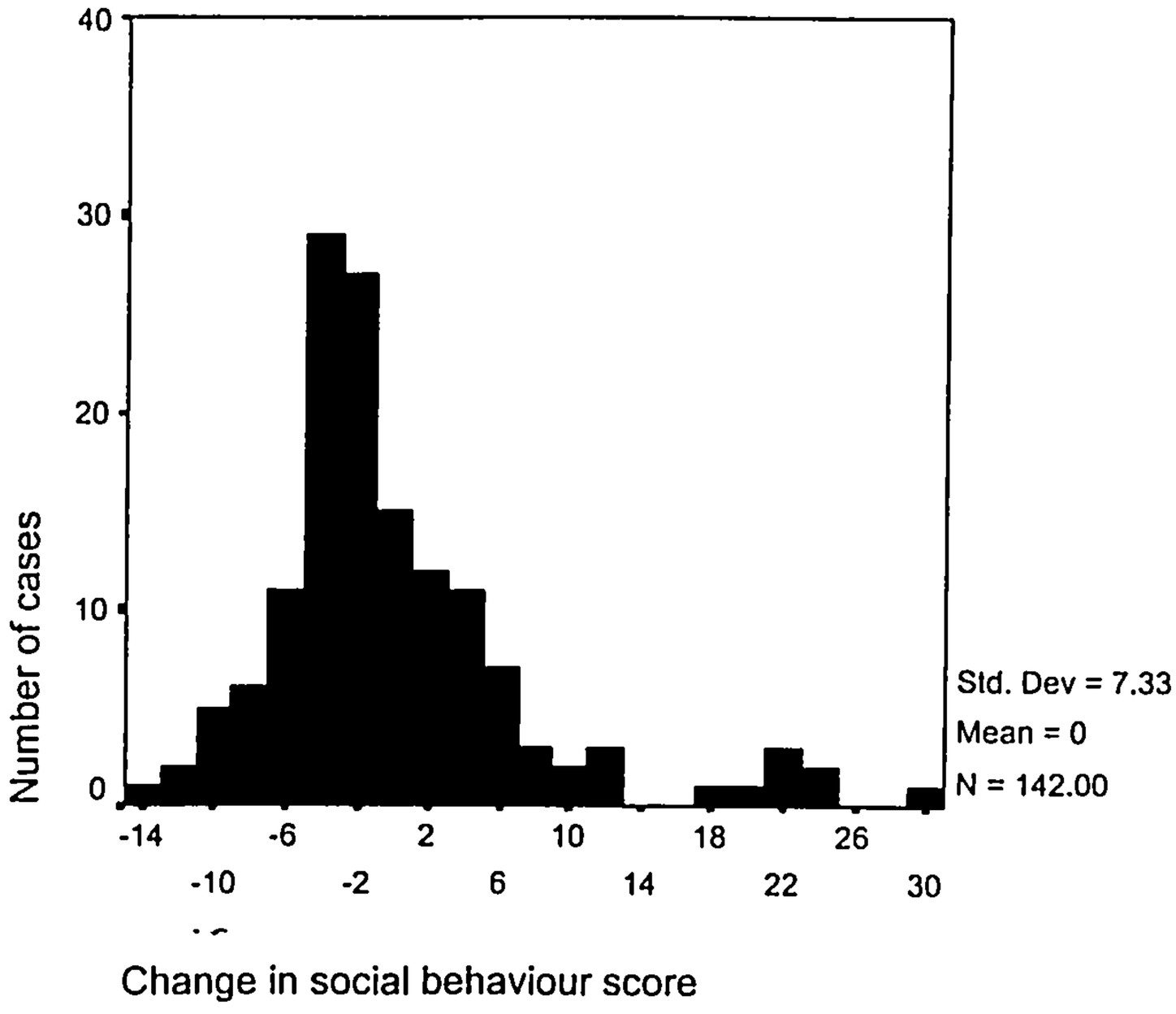
Change can be measured by simply subtracting baseline scores from those at follow-up. This has not been chosen because a simple change score does not allow for the concept of regression to the mean (Armitage and Berry, 1994). This concept implies that *ceteris paribus* we would expect patients with high initial scores to have lower subsequent scores (and vice versa). A more refined way, based on the work of Lord (1963) is to first of all regress the follow-up score on the baseline score and save the residuals. These residuals can then used as change scores to be predicted by service use data in the production function analysis. This method was chosen but was further refined by regressing the follow-up score on the baseline score *and* a number of patient characteristics. This allowed a *standardised change score* to be generated. If this had not been done then these client characteristics would have to have been included in the production function model. Given the limited number of observations and the large number of variables this would have made the effect of service costs on disability difficult to observe.

The background characteristics used to standardise the change scores were the same as those used in the production function described earlier. The variable indicating the client's sector was not though included as a standardising variable at this stage. As it is of major importance to this whole thesis it was included with the service cost variables in the production function analyses. The results of the regression equations by which standardised change scores were arrived at are shown in Table 8.3. In this model the baseline measure of social behaviour was a significant predictor of the follow-up score. The number of years of education was also predictive of follow-up social behaviour. Other variables were statistically not significant but these have not been removed from the model as they still do have some impact on the follow-up score albeit a relatively minor one. The distribution of the residuals produced by the model to be used as the change score is shown in Figure 8.4. This reveals substantial variation.

Table 8.3. Regression of follow-up social behaviour and unmet needs on baseline measures and background characteristics.

Independent variables	Coefficient	Significance
Social behaviour at baseline	0.428	<0.001
Age	0.022	0.691
Male	1.369	0.333
Married or cohabiting	-0.164	0.837
Years since first contact	-0.055	0.431
Employed	-2.680	0.371
Schizophrenia	-1.264	0.382
White	0.542	0.724
Years of education	0.100	0.052
Number of physical health problems	-0.107	0.729
Number of children	-0.689	0.461
Constant	3.143	0.342
	$R^2 = 0.256$, Adjusted $R^2 = 0.193$ N = 142	

Figure 8.4. Change in social behaviour score between baseline and follow-up, standardised for background characteristics.



Costs were measured for a six month period and social behaviour was measured for the final one of these months. Therefore we have an endogeneity problem - costs could

determine social behaviour and social behaviour could determine costs. (Although the 'overlap' period is only one month it is quite feasible in some cases for the six month costs to be concentrated into that month). As we are here only interested in the effect of costs on disability, the impact of social behaviour on costs needs to be removed. This can be done by replacing the endogenous service cost variables on the right hand side of the production function equation with *instrumental variables*. These are proxies for endogenous variables and need to act in a similar way upon the dependent variable as those they are replacing. *But unlike those variables they must not be influenced by the dependent variable i.e. social behaviour.* The most suitable instrumental variable for these follow-up costs are their baseline counterparts which by definition can not be influenced by the follow-up measure of social behaviour. However, simply substituting baseline costs for follow-up costs was not appropriate - one of the main points of this thesis is that the cost of services could have changed over time. Therefore, a more sophisticated approach – two-stage least squares - was used.

Two-stage least squares is the most common procedure for dealing with the problem of endogeneity. The process is first to regress the endogenous independent variables of interest (i.e. the follow-up service costs) on to a set of instrumental variables (i.e. baseline service costs and also any other potential predictors which can not be influenced by the outcome score). These predicted values are then used as independent variables with the change scores as dependent variables. SPSS and other packages perform both stages automatically. The baseline and follow-up costs were categorised in the same way as in the previous production function (except that GP costs were separated from other general health care costs), and the same patient characteristics were used to help predict the follow-up costs. The dependent variable in the two stage least squares model was the standardised change score described above. Table 8.4 reports the results from this analysis.

The predictive power of this model is extremely low. It can also be seen that none of the service costs are statistically significant. The signs of the coefficients are though of interest. Spending more on CPNs, day care, and GP services was related to reduced levels of social behaviour problems i.e. they caused improvements. The probability that

the effect of in-patient costs on social behaviour change was *not zero* was 0.883, and the effect appeared to be to increase social behaviour problems.

Table 8.4. Production function showing the relationship between social behaviour outcome and follow-up service costs, estimated by two-stage least squares.

Independent variables	Coefficient	Significance
Sector	0.666	0.748
CPN cost	-0.195	0.524
Day care cost	-0.084	0.632
General health care cost	0.128	0.346
GP cost	-1.374	0.774
Informal care cost	-0.026	0.782
In-patient cost	0.045	0.117
Psychiatrist cost	0.231	0.745
Supported accommodation cost	0.012	0.848
Constant	-0.484	0.823
	$R^2 = 0.048$, Adjusted $R^2 = -0.030$ N = 120	

What can we deduce from the above findings? Three points need to be made. First, if the two-stage model is correctly constructed then the conclusion is that increasing service costs does not significantly improve social behaviour. Second, the two-stage model could be incorrectly specified. This is likely to be the case. It has been assumed that follow-up costs of services can be predicted from baseline costs and other characteristics. This should be possible but ordinary least squares (which the two-stage technique uses for each stage) may not be appropriate. The cost data for individual services contains many zeros and is heavily skewed to the right. Ordinary least squares does not assume that zero is the lowest value possible. Alternative procedures to predict the cost measures include Tobit estimation which assumes that data is censored at zero (Tobin, 1958) and a two step technique where the probability of having a zero or non-zero cost is calculated and then this is combined with the predicted value for those observations which are non-zero (Duan, 1983). To generate predicted follow-up costs using either of these methods, and then to use these in estimations of the production function is beyond the scope of the relatively small data set available. Third, it is assumed in this two-stage least squares model that costs measured for the six month

period prior to follow-up interview are predictive of changes in social behaviour over two a half years. This is probably unrealistic.

8.8 Conclusions of production function analysis

The analyses presented in this section have produced very mixed results. The most theoretically appropriate approach is to identify inputs that produce change. However, as has been seen above this presented a number of estimation difficulties which may be common in other mental health research studies. The first production function which identified inputs that effected the absolute level of quality of life was though informative and also encouraging in its findings.

Spending money on certain services (CPNs, general health care, social services and accommodation) appears to have had a measurable positive impact on quality of life. However, it is important to recognise that this was in the context of a particularly deprived area of London that had recently undergone a change in the way in which psychiatric care was provided. If the study had taken place, say, five years later then the impact of service costs on quality of life may have been different. It should also be noted that the motivation of staff, particularly in the intensive sector which had seen most change, may have been especially high and this could have produced outcomes that may not be generalisable. Social workers and general health care staff though were not affected to any great extent by the changes and the costs of their inputs were also positively related to quality of life. Nevertheless, extrapolation of the results presented here to other settings should only be undertaken with caution.

9. CONCLUSIONS

This thesis has been based on an economic evaluation of sectorised community mental health services in Camberwell, south London. Community based services were compared to previously hospital based services and two different types of community service (intensive and standard) were also compared. In Section 1 four specific questions were asked, and these have been dealt with in previous sections. What follows is a summary of the main findings and some of their implications.

9.1 Question one: What are the costs of sectorised mental health care?

To answer this question it was first necessary to measure service use for a sample of patients when services were predominantly hospital based, and then after a move to community based care had taken effect. In the intensive sector there was a substantial reduction over time in the proportion of people using in-patient care, and this brought it in line with the standard sector. There was also a large rise in the proportion of people using day centres. In both the intensive and standard sectors there was a fall in the use of day-hospital care and an increase in the use of CPN care. The intensive sector had a greater supply of supported housing than the standard sector at both baseline and follow-up, and this was the main cause of its significantly higher service costs. However, the intensive sector was more expensive even after taking supported accommodation out of consideration.

It was of interest that over time the within sector mean service costs did not change to any great degree. For patients who remained in the intensive sector, six month costs fell from £4406 to £4012, whilst in the standard sector the corresponding figures were £2260 and £2175. This apparent resource stability hides fundamental changes which were happening in the structure of services in the two areas, and reflects the fact that the service changes took place without the investment of additional revenue expenditure.

9.2 Question two: Does an intensive model of sectorised mental health result in superior cost-outcome ratios than standard care?

In addition to service use and costs, a number of other aspects of patient care were measured. Across the two sectors two measures, social networks and social behaviour, revealed marked improvements. However, there was a relatively large increase in the mean number of identified unmet needs over time. Most measures, though, did not change substantially between baseline and follow-up, although clearly for some *individual* patients there would have been noticeable improvements/deteriorations over time.

Outcome and cost data were combined in the form of cost-outcome ratios. When calculated for each sector separately it was shown that the cost associated with achieving a improvements on most outcome measures was far higher in the intensive sector than in the standard sector. This at first implies that the standard sector is more efficient than the intensive sector. However, outcomes were greater on most measures in the intensive sector – it is the far higher *costs* that result in worse cost-outcome ratios. Therefore, the evidence suggests that better outcomes could be achieved in the intensive sector but at a higher cost, whilst more moderate gains were likely in the standard sector but at lower costs.

9.3 Question three: What impact do patient characteristics have on service costs?

The reporting of mean costs is important but it does not inform us about how and why costs vary between patients. In Section 6 it was shown that at follow-up cost variations were wide, and a cost prediction equation was constructed in order to identify influential patient characteristics. It was found that higher service costs were especially associated with greater levels of disability and symptomatology. Lower costs were linked to having children, more years of education, and a shorter duration of illness.

With patient characteristics taken into account it was found that patients who stayed in the intensive sector were on average £1828 more expensive during the six month

follow-up period than those who stayed in the standard sector. Patients who moved away from the intensive and standard sectors were also more expensive than those standard sector patients who stayed (the differences were £2023 and £4602 respectively).

9.4 Question four: What impact do service costs have on outcome?

In Section 7 a variety of cost-outcome ratios were calculated. However, because this was not a randomised controlled trial it was not possible to be certain that outcomes were directly linked to costs. To ascertain the extent to which costs and outcomes were linked production functions were generated using regression analyses, with outcome as the dependent variable and disaggregated service costs included as independent variables.

The first production function used quality of life as the dependent variable. This was not strictly an outcome score as it was quality of life measured at a single point in time – not a change over time. However, it did allow for relatively straightforward analyses and interpretation of results. It was found that increased costs of CPNs, general health care services, social services and accommodation were associated with greater levels of patient quality of life. In-patient costs were at first inversely related to quality of life, but at a certain point higher costs produced *increased* levels of quality of life. Variables indicating sector and time period were not statistically significant.

The second production function did include a change score as the dependent variable. This required the use of two-stage least squares due to the problem of endogeneity. The outcome measure chosen was social behaviour. No cost variables were statistically significant. There were difficulties in applying two-stage least squares to this data set. This was particularly the case with regard to the prediction of follow-up costs (the first stage of the procedure) which contained many zero values and were generally skewed. As such the first production function model was more valid.

9.5 Limitations of PRiSM Psychosis Study

The *PRiSM Psychosis Study* was designed so that the effects of two different models of community mental health care could be compared within ordinary settings and routine clinical practice. This however led to a number of limitations which need to be considered. Critiques of the study method have appeared in the *British Journal of Psychiatry* (Marshall et al, 1999; Sashidharan et al, 1999).

The first limitation of the study was the relatively high drop-out rate. Section 4 reports that approximately one third of selected clients were not interviewed at baseline, with a figure in excess of 40% at follow-up. The sample included cases who were not in current clinical contact and a high level of attrition of these would not be unexpected. At follow-up it was known that non-attendance of clinical services was relatively high and so again a high number of drop-outs could be expected. Although a high drop-out rate is not uncommon in mental health research it does present a problem of representativeness. Section 4 found that on a large number of factors the interviewed clients were representative of the identified sample; however, non-measured factors could well have been different. If this is the case then the costs that were produced in the study would be biased, but whether this did happen and to what extent is unclear.

Second, the fact that many clients did not use the services of the psychiatric teams means that the impact of the teams on outcome would be 'diluted'. This though can be seen as a strength of the study also. We were not only interested in the impact of the community teams on the outcomes for service users but also for the whole prevalent group of people with psychotic disorders, whether or not in contact with services. Non-use of the psychiatric services would have occurred particularly for patients who were non-symptomatic, and this would have had a downward impact on service costs.

Third, this study was a non-randomised controlled trial. The consequence of this design is that site specific effects (e.g. historical patterns of service provision) can not be fully excluded as sources of confounding effects (whereas they can be expected to be controlled for in a randomised trial). A further consequence is that the cost-outcome ratios which were discussed in Section 7 may not reflect differences in the psychiatric

services but rather the other services that were also being utilised, and may also be confounded by differences in client characteristics.

Fourth, because the mental health services were introduced into routine settings it was not straightforward to ensure that fidelity to a particular model was maintained. It is likely that staff would have to adapt to the variations that they would invariably face in their everyday work situation and, therefore, adherence to a strict system of any particular model would not have been realistic. This creates a problem in that the results of this study can not readily be compared to those where strict fidelity is maintained. However, the pragmatic nature of the study perhaps enhances its applicability, and it should be noted that the community mental health teams are still working in largely the same way some eight years after the start of the study.

Fifth, the standard service was relatively well established whereas in some previous studies the control comparison has consisted only of hospital based care. Consequently the potential for the identification of any extra benefit produced by the intensive services is limited. This again has the disadvantage of a reduced ability to compare the results to those shown elsewhere which may be favourable to the experimental condition in the absence of a good comparison condition.

Sixth, there are limitations with the method used for costing the services. For instance medication costs were not included and some clients at follow-up may have received atypical antipsychotic medications, which are relatively expensive. However, it is unlikely that the number would be high and different between the sectors. Also the unit costs of in-patient care, day care and residential care applied to the whole facility or ward. In reality each client would, on a given day, use a different amount of staff time than other clients and this would result in a different unit cost per person. Finally, client time costs were not measured. This means that the cost actually produced may be an underestimate of the true social costs.

9.6 Implications

This thesis has shown that although mental health services experienced much change over time in the intensive sector, and to a lesser extent in the standard sector, the patient based average costs of provision were fairly static. However, the costs of some individual services did increase substantially, but there were compensating decreases elsewhere. This reinforces the need to measure services comprehensively, as a more narrow focus could lead to cost effects remaining unidentified.

The intensive sector was more expensive than the standard sector for two reasons. Firstly, those patients in contact with psychiatric services were more likely to receive greater levels of CPN, psychiatrist and general health care. Secondly, there were pre-existing differences between the two sectors, most notably with regard to the provision and use of supported accommodation. In addition it was shown that the intensive sector clients were on average more disabled than those in the standard sector. (Although after controlling for this in the cost prediction analysis there remained a sector difference). Therefore, the higher costs in the intensive sector were only partly due to the intervention that took place.

It was clear, therefore, from both sectors that introducing community mental health services as replacements for hospital based care produced no short-term cost savings. It was also apparent that not all people with psychosis made use of psychiatric care. It was important for the purposes of this study to include a representative sample of all patients because we were interested in *all* care delivered in the sectors not just specific psychiatric services. Other studies have focused on the latter, often in experimental conditions, and these have produced valuable findings. However, we have been interested in the integration of innovative services into routine settings.

It has been important to show that costs vary substantially and also to identify factors which influence such variation. The accumulation of such evidence could have beneficial effects for those responsible for allocating resources at different levels of provision. This exercise also revealed that patients who moved away from the standard sector had, on average, particularly expensive packages of care. The likely cause of this

was the low level of use of supported accommodation within the standard sector. This has both clinical and research implications. From a clinical point of view low provision of supported housing could result in a potentially less disabled patient population, whilst greater provision could result in an inflow of more disabled patients. For research purposes it is important to realise that, although two areas may be similar in broad socio-demographic factors, if services such as supported accommodation are provided in differing amounts then samples drawn from the areas may be dissimilar on certain characteristics. This was the case in this study – the intensive sector had higher mean baseline levels of disability as measured by both the GAF and the SBS.

The intensive sector produced slightly better outcomes than the standard sector on most measures. However, the fact that the standard sector was on average far less expensive meant that the latter had superior cost-outcome ratio than the former. Therefore, it is a value judgement as to whether the extra gain in the intensive sector is worth the extra cost. This is an important finding as it shows that intensive community based services *can* generate improved patient outcomes but at a greater cost. Good community care therefore requires appropriate resourcing. It is also crucial to realise that although in experimental settings community services have usually been shown to be superior to hospital based care, in routine settings the effects will be less evident. This is because some patients will not have contact with the psychiatric services, but also because in the absence of experimental conditions it is likely that routine services will have to be much more realistic in who they care for and how this is done. The routine nature of the services studies here is shown by the fact that in both sectors the services investigated continue today, six years after their inception.

Finally the fact that it has been shown that higher levels of quality of life can be achieved by increasing costs in specific areas is promising. This suggests that the direction that mental health care has been moving during the past four decades can be beneficial to patient well being.

What then are the main implications of this study for service planning? First, as was shown in Section 5, it is important to recognise that community mental health care consists of many different services provided by a number of agencies (including

informal carers). Changing the way in which *psychiatric* care is provided needs to be planned within the wider context. This thesis has shown that non-psychiatric services are widely used by clients (Section 5) and that these can have a positive impact on quality of life (Section 8). Second, the supply of certain services appears to generate 'demand' that is not necessarily based on need. This was particularly the case with supported accommodation and there is the possibility that the provision of such a service can lead to movements into or out of an area, which in turn affects the use of other services. If supply created demand exists that is not based on need then there is the possibility of resources being wasted. Third, as well as supply creating demand it has been shown (Section 6) that use of resources is also influenced by non-clinical factors such as education, age and family structure. Planners should recognise such factors as they may help to target services more appropriately and equitably. Fourth, the wide range of outcome measures used in the study showed (Section 7) that the achievement of all desirable outcomes for clients is probably unrealistic. It may be more suitable to focus on specific outcomes such as improving social networks or employment prospects.

This thesis also has implications for the way in which future economic evaluations are conducted. First, the multiplicity of outcome measures (Section 7) was crucial for the study but presents difficulties in conducting cost-effectiveness or cost-utility analyses which both require a single outcome measure. Health economic evaluations in other areas frequently use QALYs. Although there are difficulties in applying the QALY method to psychiatry, this in itself should be a spur to exploratory analyses using scales such as the EuroQol (EuroQol Group, 1990) or its derivative the EQ5D. Second, the fact that community care consists of many components means that it is necessary to identify which components have a positive effect on outcome. The production function approach, as used in this thesis, is useful for this purpose but it can pose specific statistical challenges. In particular it is necessary to avoid the problem of endogeneity (outcomes affecting costs and *vice versa*), and this can be achieved by using techniques such as two-stage least squares (which would benefit from a larger sample size) or by ensuring that the cost period and outcome period are separated in time. Third, when conducting economic evaluations it is important to recognise that high service costs may not reflect need but can be supply driven. It may, therefore, be necessary to control for

such supply side factors when interpreting economic findings. Fourth, mental health outcomes are dependent not only on service inputs and client characteristics but also on other activities that are undertaken. In particular leisure time activities could have a crucial impact. These were not measured in this study and future research should include them. Finally, in order to gauge the overall social cost of community mental health care it is necessary to calculate the costs of formal services, informal care and patient time. The latter was not calculated here largely because there is no definitive method for doing so. In conclusion, therefore, it can be seen that as well as examining the relative effects and costs of sectorised community mental health care this thesis has also identified areas of research which require further attention.

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APPENDIX

CLIENT SERVICE RECEIPT INTERVIEW

PRiSM
CLIENT SERVICE RECEIPT INTERVIEW
PSSRU in collaboration with Psychiatric Research in Service Measurement

ALL QUESTIONS RELATE TO THE LAST SIX MONTHS
All information will be treated in the strictest confidence

BACKGROUND INFORMATION

PRiSM Case no. ☐☐☐☐☐☐

PRiSM Questionnaire no. 0 4

1.1 Name of client

_____

1.2 Date of birth

Day		Month		Year	

1.3 Gender ☐
(Male [1], Female [2])

	Time 1	Time 2	Time 3
1.4 Marital status *Code as follows:* *[1] Single* *[2] Married* *[3] Widowed* *[4] Separated/divorced* *[5] Living together*			
Code	☐	☐	☐
1.5 Date of interview	Day Month Year ☐☐ ☐☐ ☐☐	Day Month Year ☐☐ ☐☐ ☐☐	Day Month Year ☐☐ ☐☐ ☐☐
1.6 Interviewer	☐☐☐	☐☐☐	☐☐☐
1.7 Subject status	☐☐	☐☐	☐☐
1.8 Place of interview	☐☐☐	☐☐☐	☐☐☐

ACCOMMODATION

2.1 Details of accommodation in past six months

	Time 1	
	Current	**Other**
Name & address		
Length of stay/dates		
Type of accommodation *see card 2.1*	☐☐	☐☐
Number of bedrooms		
Number of other residents		
Total number of day staff*		
Total number of night staff*		
Managed by (name) *see card 2.1*	☐	☐
Furnished by *see card 2.1*	☐	☐
Total charge (£ per month/week)		
Client's contribution (£ per month/week)		
Source of client's contribution *see card 2.1*	☐	☐

* These questions should only be answered where client lives in specialised (non-hospital) accommodation

Time 2		
	Current	**Other**
Name & address		
Length of stay/dates		
Type of accommodation *see card 2.1*	☐☐	☐☐
Number of bedrooms		
Number of other residents		
Total number of day staff*		
Total number of night staff*		
Managed by (name) *see card 2.1*	☐	☐
Furnished by *see card 2.1*	☐	☐
Total charge (£ per month/week)		
Client's contribution (£ per month/week)		
Source of client's contribution *see card 2.1*	☐	☐

* These questions should only be answered where client lives in specialised (non-hospital) accommodation

Time 3		
	Current	**Other**
Name & address		
Length of stay/dates		
Type of accommodation *see card 2.1*	☐☐	☐☐
Number of bedrooms		
Number of other residents		
Total number of day staff*		
Total number of night staff*		
Managed by (name) *see card 2.1*	☐	☐
Furnished by *see card 2.1*	☐	☐
Total charge (£ per month/week)		
Client's contribution (£ per month/week)		
Source of client's contribution *see card 2.1*	☐	☐

* These questions should only be answered where client lives in specialised (non-hospital) accommodation

2.2 Does client currently live with others? Please complete the table below on their relationship, sex, age and work status.

Time 1											
Relationship to client	Sex		Age					Employment			
	M	F	0-4	5-15	16-49	50-64	64+	Occupation	Full-time	Part-time	Not working

Time 2 (if different from Time 1)											
Relationship to client	Sex		Age					Employment			
	M	F	0-4	5-15	16-49	50-64	64+	Occupation	Full-time	Part-time	Not working

Time 3 (if different from Time 2)											
Relationship to client	Sex		Age					Employment			
	M	F	0-4	5-15	16-49	50-64	64+	Occupation	Full-time	Part-time	Not working

2.3 Has client been admitted to prison or hospital (general or psychiatric services) in the last six months?

Time 1		Time 2		Time 3	
Name of placement	Dates and lengths of stay	Name of placement	Dates and lengths of stay	Name of placement	Dates and lengths of stay

EMPLOYMENT

3.1 Present employment/occupation

Code as follows:

[1] Open employment
[2] Sheltered employment
[3] Full-time housewife/husband
[4] Full-time student
[5] Retired
[6] Registered as unemployed
[7] Not working and not registered as unemployed
[8] Receiving sickness/invalidity benefit

	Time 1	Time 2	Time 3
Description	_____	_____	_____
Code	☐	☐	☐

3.2 Work history

Please complete the table below for the last six months, noting all status changes in that time, *starting with current status*. Please also include sheltered employment and any periods of unemployment.
If client receives a wage at present please state *gross* wage per week (that is, *before* national insurance, superannuation and other deductions).
[Record **net** *wage if gross not known, and state* **net** *in box.]*

Time 1							
Status over last six months			**Average number of hours worked per week**		**Weekly income (i.e. total before tax or other deductions)**	**Did client change jobs because of mental health problems? (please circle)**	
From month/year	**To month/year**	**Code as Q3.1**	**Less than 30**	**More than 30**			
						YES	NO
						YES	NO
						YES	NO
						YES	NO

Time 2							
Status over last six months			**Average number of hours worked per week**		**Weekly income (i.e. total before tax or other deductions)**	**Did client change jobs because of mental health problems? (please circle)**	
From month/year	**To month/year**	**Code as Q3.1**	**Less than 30**	**More than 30**			
						YES	NO
						YES	NO
						YES	NO
						YES	NO

Time 3							
Status over last six months			**Average number of hours worked per week**		**Weekly income (i.e. total before tax or other deductions)**	**Did client change jobs because of mental health problems? (please circle)**	
From month/year	**To month/year**	**Code as Q3.1**	**Less than 30**	**More than 30**			
						YES	NO
						YES	NO
						YES	NO
						YES	NO

3.3a While working, how many days did client have 'off sick' from work in the last six months?

Time 1	Time 2	Time 3
_____	_____	_____

3.3b How many of these days off were because of client's mental health problems?

Time 1	Time 2	Time 3
_____	_____	_____

FINANCES

4.1 Does client **currently** receive any social security benefits?
(Code as follows: Yes [1], No [2])

Time 1	Time 2	Time 3
_____	_____	_____

If YES, list details below *(see card 4.1)*. *Mark 'E' if estimate.

Time 1			Time 2			Time 3		
Benefit	**Amount per week***	**Period of receipt**	**Benefit**	**Amount per week***	**Period of receipt**	**Benefit**	**Amount per week***	**Period of receipt**
Current total per week* £_____			Current total per week* £_____			Current total per week* £_____		

4.2 Has client received any other benefits over the last six months? Please record amount of Social Fund grant or loan as a lump sum. *Mark 'E' if estimate.

Time 1 **Time 2** **Time 3**

_____ _____ _____

If YES, list details below.

Time 1			Time 2			Time 3		
Benefit	Amount per week*	Period of receipt	Benefit	Amount per week*	Period of receipt	Benefit	Amount per week*	Period of receipt

4.3 Does client have any other sources of income?

(Code as follows: Yes [1], No [2])

Time 1 **Time 2** **Time 3**

_____ _____ _____

If YES, approximately how much in total per week?

Time 1 **Time 2** **Time 3**

£_____ £_____ £_____

What is the source of this income?

Time 1 **Time 2** **Time 3**

_____ _____ _____

_____ _____ _____

4.4 Does client have any of the following expenses?
If YES, list details below, including frequency of payment (e.g. per week, per month). If no payment made enter 'none'.

	Time 1	Time 2	Time 3
Local taxes*	£_____	£_____	£_____
Fines	£_____	£_____	£_____
Maintenance	£_____	£_____	£_____
Debts	£_____	£_____	£_____
Drugs/alcohol	£_____	£_____	£_____
Other	£_____	£_____	£_____
Other	£_____	£_____	£_____

*e.g. Community Charge or Council Tax.

SERVICE RECEIPT

5 Service receipt over the last six months *(see also card 5)*

Time 1							
Service	Name of service	Provider agency (name)	Total number of contacts in last six months	Average duration of direct contact	Client's time and mode of travel	Number of home visits	Number of clients sharing one visit
Psychiatric hospital out patient							
Psychiatric hospital day patient							
Psychiatric hospital emergency clinic							
Psychiatric hospital depot clinic							
General hospital out-patient							
General hospital day patient							
General hospital A&E							
Psychiatrist							
Other Consultant							
Psychologist							
CPN/CPHN							
Other community nurses							
Occupational therapy							
Chiropodist							
Physiotherapy							
Drug/alcohol service							
GP (surgery)							

Time 1 (continued)							
Service	Name of service	Provider agency (name)	Total number of contacts in last six months	Average duration of direct contact	Client's time and mode of travel	Number of home visits	Number of clients sharing one visit
GP (home visit)							
Dentist							
Optician							
Social worker							
Day centre							
Drop in centre							
Sheltered workshop							
Work rehab. service							
Home help/home care worker							
Counselling/advice services							
Job centre							
Adult education							
Legal services							
Police							
Court attendance							
Probation officer							
Other							
Other							
Other							

Time 2							
Service	Name of service	Provider agency (name)	Total number of contacts in last six months	Average duration of direct contact	Client's time and mode of travel	Number of home visits	Number of clients sharing one visit
Psychiatric hospital out patient							
Psychiatric hospital day patient							
Psychiatric hospital emergency clinic							
Psychiatric hospital depot clinic							
General hospital out-patient							
General hospital day patient							
General hospital A&E							
Psychiatrist							
Other Consultant							
Psychologist							
CPN/CPHN							
Other community nurses							
Occupational therapy							
Chiropodist							
Physiotherapy							
Drug/alcohol service							
GP (surgery)							

Time 2 (continued)							
Service	Name of service	Provider agency (name)	Total number of contacts in last six months	Average duration of direct contact	Client's time and mode of travel	Number of home visits	Number of clients sharing one visit
GP (home visit)							
Dentist							
Optician							
Social worker							
Day centre							
Drop in centre							
Sheltered workshop							
Work rehab. service							
Home help/home care worker							
Counselling/advice services							
Job centre							
Adult education							
Legal services							
Police							
Court attendance							
Probation officer							
Other							
Other							
Other							

Time 3							
Service	Name of service	Provider agency (name)	Total number of contacts in last six months	Average duration of direct contact	Client's time and mode of travel	Number of home visits	Number of clients sharing one visit
Psychiatric hospital out patient							
Psychiatric hospital day patient							
Psychiatric hospital emergency clinic							
Psychiatric hospital depot clinic							
General hospital out-patient							
General hospital day patient							
General hospital A&E							
Psychiatrist							
Other Consultant							
Psychologist							
CPN/CPHN							
Other community nurses							
Occupational therapy							
Chiropodist							
Physiotherapy							
Drug/alcohol service							
GP (surgery)							

Time 3 (continued)

Service	Name of service	Provider agency (name)	Total number of contacts in last six months	Average duration of direct contact	Client's time and mode of travel	Number of home visits	Number of clients sharing one visit
GP (home visit)							
Dentist							
Optician							
Social worker							
Day centre							
Drop in centre							
Sheltered workshop							
Work rehab. service							
Home help/home care worker							
Counselling/advice services							
Job centre							
Adult education							
Legal services							
Police							
Court attendance							
Probation officer							
Other							
Other							
Other							

INFORMAL CARE

6.1 Has a friend or relative had to give up work/school to spend time with client at home?

(Code as follows: Yes [1], No [2])

Time 1_____ **Time 2** _____ **Time 3** _____

If YES, who was this (relationship with client)?

Time 1_____ **Time 2** _____ **Time 3** _____

How much time did s/he lose from work/school in the past six months?

Time 1_____ **Time 2** _____ **Time 3** _____

6.2 Has client seen more of friends and relatives because of his/her mental health problems?

(Code as follows: No extra visits [0], Subject visited relative/friend [1], Relative/friend visited subject [2])

Time 1			
Relationship	Code	Frequency of visits	Duration of visits

Time 2			
Relationship	Code	Frequency of visits	Duration of visits

Time 3			
Relationship	Code	Frequency of visits	Duration of visits

OTHER SERVICES

7.1 Have any reviews or meetings concerning this client taken place in the last six months?

(Code as follows: Yes [1], No [2])

Time 1	Time 2	Time 3
_____	_____	_____

If YES, name of contact?

Time 1	Time 2	Time 3
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

7.2 Are there any particular services, people or professionals that could be of assistance to this client?

(Code as follows: Yes [1], No [2])

Time 1	Time 2	Time 3
_____	_____	_____

If YES, what are they?

Time 1	Time 2	Time 3
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Thank you

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